



WARPAINT SERIES No.142

Dassault **MIRAGE F1**

By Andy Evans

A French Air Force Mirage F1 returns to its mission after receiving fuel from a US Air Force KC-10 Extender while flying over Afghanistan in support of Operation 'Enduring Freedom', on 25 November 2010. (US Air Force Photo/Staff Sgt. Eric Harris)



Mirage F1, n°04, *Centre d'expériences aériennes militaires (CEAM)*, BA 118 Mont-de-Marsan, 1971.



Mirage F1C, n°26, *Escadron de chasse 3/30 Lorraine*, BA 112 Reims-Champagne, 1974.



Mirage F1C, n°45, *Escadron de chasse 1/5 Vendée*, BA 115 Orange-Caritat, 1975.

SPA 124 Jeanne d'Arc



Mirage F1C-200, n°221, *Escadron de chasse 1/5 Vendée*, BA 115 Orange-Caritat, 1978.



SPA 173 Oiseau de paradis



Mirage F1C, n°09, *Escadron de chasse 2/12 Picardie*, BA 103 Cambrai, June 1979.



Mirage F1C, n°69, *Escadron de chasse 2/30 Normandie-Niemen*, BA 112 Reims-Champagne, June 1979. Note the Paris Air Show codes.



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INTRODUCTION

When anyone says the words Dassault Mirage, instantly the iconic delta wing shape, synonymous with the Dassault Mirage family from the Mirage III, Mirage IV and Mirage 5 up to the Mirage 2000, comes to mind. However, this design chain was broken with the high-wing, slender Mirage F1 being completely different, yet still a Mirage!

During the 1960s, Dassault commenced development of what would become the

Mirage F1 as a private venture, alongside the larger Mirage F2. Work on the F1 eventually took precedence over the more costly F2, which was cancelled during the late 1960s. The *Armée de l'Air* took great interest in the fledgling F1 to meet its requirement for an all-weather interceptor aircraft. Accordingly, initial production units were equipped with the Thomson-CSF Cyrano IV monopulse radar. The Mirage F1 was of similar size to the Mirage III and Mirage 5 and was powered by the same SNECMA Atar engine that had been used on the larger Dassault Mirage IV, however, unlike its predecessors, it had the layout of a swept wing, but mounted high on the fuselage, and a conventional tail surface as used by the F2. Although it had a smaller wingspan than the Mirage III, the Mirage F1 nevertheless proved to be superior to its predecessor, carrying more fuel while possessing a shorter take-off run and greater manoeuvrability.

In order to comply with the French Air Force's requirement for an all-weather interceptor, the first production Mirage F1C was equipped with a Thomson-CSF Cyrano IV radar system. The later Cyrano IV-1 version added a limited look-down capability. By October 1971, the Mirage F1 was under production at both Dassault's Bordeaux facility and at SABCA's plant in Belgium, work at the latter having been performed under an industrial arrangement associated to Belgium's order for 106 Mirage 5 aircraft. During May 1973, the first deliveries to the French Air Force took place with the type entering squadron service with EC

Above: An Ecuadorian Air Force Mirage F1E.

2/30 Normandie-Niemen in December of that year, and shortly thereafter, the type was deployed as the country's main interceptor, a capacity in which it continued to serve until the arrival of the Mirage 2000. It later transitioned to the aerial reconnaissance role and then to a multi-role aircraft until June 2014, when the last French Mirage F1s were retired from service.

Powered by a single SNECMA Atar 9K-50 turbojet engine and armed with an array of French and American-sourced armaments, the Mirage F1 has been operated as a multi-purpose fighter and attack aircraft and has been exported to around a dozen nations. The type has seen action in a large number of armed conflicts involving several of its operators, including the Western Sahara War, the Paquisha War, the Cenepa War, the Iran-Iraq War, the Gulf War, the South African Border War, the War in Afghanistan, the Chadian-Libyan conflict, the 2011 military intervention in Libya, and the Northern Mali conflict. More than 720 Mirage F1s were manufactured between 1966 and 1992, and it was succeeded in production by the Dassault Mirage 2000. The F1 was, as noted, flown by the French Air Force, and widely exported to South Africa, Ecuador, Gabon, Iran, Greece, Libya, Iraq, Jordan, Congo, Kuwait, Qatar, Morocco and Spain, as well as to civilian defence contractors operating in the United States of America, and has latterly found favour in the dissimilar aircraft training role with private companies such as ATAC and Draken International.

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Dunstable Business Centre, Office Suite No.2
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Bedfordshire LU5 5BQ

Tel: +44 (0)1582 668411

Email: tom@guidelinepublications.co.uk

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Left: An Armée de l'Air Mirage F1CR seen during Operation 'Serval' in Mali. (Armée de L'Air)

Right: One of the Mirage F2 prototypes. (Dassault)

DEVELOPMENT OF THE MIRAGE F1

In 1963, the French Air Force worked out their specifications for a new low-altitude, all-weather aircraft capable of supersonic interception, and suitable for use on short runways with limited equipment, at an approach velocity of less than 140 knots. Dassault's four proposals were built and flown in a short space of time. The Mirage IIIT, which closely resembled the Mirage IIIE, was a single-seat tailless delta with increased power provided by a SNECMA-built variant of the Pratt & Whitney JTF10, designated the TF306. The prototype IIIT, No.01, first flew on 4 June 1964, but powered by an interim TF104B. The Mirage IIIF had a conventional high-mounted wing, plus horizontal tail surfaces. Three were built, with one being a private venture. The Mirage IIIG and IIIG8 were variable geometry versions of the Mirage III and only one example of the IIIG was built. This aircraft took to the air on 18 November 1967, and was only intended as an interim prototype with a carrier-borne single engine IIIG2 and a scaled up twin-engine IIIG4 planned. These variants were deemed too costly and cancelled, however, the G8 prototype was followed by two further prototypes Nos.01 and 02, which flew respectively on 8 May and 13 June 1972. The



final proposal was the Mirage IIIV, which was a vertical take-off version, which first flew on 12 February 1965. The vertical take-off aircraft was seen to be impractical and the IIIT suffered from some undesirable characteristics. The G8 showed more promise, becoming the basis for the G8A, but high costs killed the program in December 1975.

Whilst development of the Mirage IIIG proceeded, the IIIF was left to meet the Air Force's near-term needs. On 21 November 1963, the Dassault corporation signed the development contract for a prototype aircraft, the Mirage IIIF, equipped with a TF 106 jet engine. This original delta wing design was replaced by a high, sharply sweptback and

lift-augmented wing. The stabilisers were mounted low on the fuselage, which was a first for Dassault.

In 1965, three two-seat Mirage F2 prototypes were ordered for the Air Force. Israel, which was looking for a low-altitude aircraft able to penetrate up to 800km, also took an interest in the project but the deal fell through. On 12 June, 1966, at Istres, Jean Coureau took off in Mirage III F2 01 equipped with a TF 30 jet engine. It was the first aircraft in which trial flight data was transmitted by telemetry, increasing the aid the trial team could offer the pilot, and thus improving the security and continuity of trials. On 29 December it achieved Mach 2 and made a landing in 48m.

As a result of France's announced withdrawal from NATO's integrated military organisation, the Air Force's new priority was an air defence program. In May 1966, the general staff wanted to transform the Mirage F2 into an interceptor aircraft. This resulted in the Mirage F3 program, a single-seat fighter with one Pratt & Whitney/SNECMA TF 306 engine. However, the Mirage F3 was not completed, following another change in the definition of priorities by the Air Force and due to the success of programs for variable geometry aircraft. It was also considered too costly and too dependent on American technology with regards to the engine. In November 1967, with the success of the flights of Mirage G01, the general staff declared itself in favour of a twin-engine swing-wing aircraft. Development of the Mirage F2/F3 was then officially stopped, although the weapons systems test rig based on a central digital computer was continued. The information acquired led to the weapons system of the Mirage 2000.

In mid-1964, aware of the dead end represented by aircraft with large engines too expensive for export, Dassault had initiated a discrete design for a small Mach 2 aircraft. The ensuing Mirage IIIE2 design was therefore a single-seat aircraft with a sweptback wing like the Mirage II F2 and equipped with a SNECMA Atar 9K engine exactly like the Mirage IV A and was primarily intended for export. As of the end

Above left: The Mirage III F2 01 was equipped with a TF 30 jet engine. (Dassault)

Left: On 12 June 1966 at Istres, Jean Coureau took the Mirage F2 on its maiden flight (Dassault)

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Right: Mirage F1 01 made its first flight on 23 December 1966 at Melun-Villaroche piloted by René Bigand (Dassault)

of 1965, manufacture of a prototype began that would be suitable for the French Air Force with the contribution of industrial partners. In conjunction with this the French Air Force staff's need for an aircraft to supplant its earliest Mirage IIIs, and simultaneously one able to land at slower speeds, triggered the Mirage F1 program. The Air Force staff had drafted its specifications for an all-weather low-altitude intruder in 1963. They stipulated that the aircraft needed supersonic interception capabilities, would need to be able to use short and rudimentarily equipped landing strips, and have an approach speed of less than 140 knots. It also needed to accommodate two basic operational factors - longer autonomy and a greater mission radius, and shorter take-off and landing distances, freeing it from having to use easy-to-spot and exposed larger runways - and all at the lowest possible cost. The Mirage III family's delta wing meant pilots needed to approach and land at high speed. Extensive research on minimum combat aircraft speeds led Dassault to look at swept-wing designs, which, at that point in development, were the ones able to house high-lift flaps. As noted above, when France announced its intention to withdraw from NATO's integrated military organisation in 1966, the Air Force began focusing on an interceptor with secondary penetration

Right: The Mirage F1 led to the creations of several versions. (Dassault)

Below: The Mirage F1 used a shoulder-mounted swept wing, instead of the delta wing of the Mirage III. (Dassault)



Right: The Thomson-CSF Cyrano IV monopulse radar system, served as the main sensor.

Below right: The initial armament of the Mirage F1 was a pair of internal 30mm DEFA 553 cannons. (Dassault)

capabilities. Successive cancellations left Dassault without a successor for its Mirage III. The need to overcome this deadlock, and to secure a future if the variable-sweep aircraft program was also aborted, led Marcel Dassault to start working on a new prototype, the Mirage F1, a smaller version than the Mirage F2 and Mirage F3.

The experience designing the Mirage F2 proved valuable in efforts to develop the Mirage F1, and its lighter weight made it especially suitable as an interceptor. One of the Mirage F1's features was its ample airspeed variations. It could fly at Mach 2 and land at 125 knots, thanks to its wing's extraordinary lift augmentation from its leading-edge nose and double-slot flaps. Equipped with an interim SNECMA Atar 9K-31 jet engine, the Mirage F1 01 made its first flight on 23 December 1966 at Melun-Villaroche piloted by Dassault chief pilot René Bigand. On 7 January 1967, it reached Mach 2 on its fourth flight. Flight trials continued until, during a low-altitude high-velocity pass, the horizontal stabilisers of Mirage F1 01 broke away due to a divergent vibration phenomenon called 'flutter' and the aircraft struck the ground near Fos-sur-Mer, killing Bigand. Despite the accident, notification was given of an order for three pre-production aircraft - the Mirage F1 02, 03, and 04 with the Atar 9K-50 jet engine. Mirage F1 02 with an Atar P 131 engine accomplished its first flight at Istres on 20 March 1969 piloted by Jean-Marie Saget, and reached Mach 1.15. Mirage F1 03, equipped with a SNECMA 9 K 50 engine, first flew on 18 September 1969, and Mirage F1 04, equipped with all the on-board electronics designed for the production aircraft, on June 17, 1970.

The first flight of the first production model took place at Mérignac on 15 February 1973, piloted by Guy Mitaux-Maurouard, and on 14 March it was delivered to the French Air Force. The production models differed from the prototypes by the installation of slotted leading-edge (inspired by the Jaguar) on the outboard two-thirds of the wing, which increased the maximum angle of attack. The Mirage F1 led to the creations of several versions. The Mirage F1C was a basic version optimised for all-weather all-altitude air



defence. Later, two new versions, the Mirage F1CR and the Mirage F1CT, were used to equip the Air Force when the Mirage IIIR and IIIE reached the end of their lives. The Mirage F1A was the day version of the F1C with simplified electronic equipment and additional fuel capacity. This version was designed at the request of South Africa as the F1AZ. The Mirage F1B was the two-seat version of the Mirage F1C initially developed at the request of Kuwait and was also acquired by the French Air Force. The Mirage F1CR was optimised for low-altitude day and night reconnaissance, while the Mirage F1R was the export version of the F1CR used by the French Air Force.

From the outset, the Mirage F1 was an export success, and some 473 aircraft equipped the Air Forces of South Africa, Spain, Greece, Kuwait, Libya, Morocco, Ecuador, Iraq, Jordan, and Qatar. Dassault also designed the export Mirage F1E, which could fulfil all the missions of the F1C but was equipped with avionics for more precise air-to-ground missions and longer firing distances. On 26 May 1967, an order for three Mirage F1 prototypes was placed, while the larger and more expensive Mirage F2 was formally abandoned. These three pre-service aircraft,

along with a static structural test airframe, soon joined the test programme. By late 1971, the construction of an initial batch of eighty-five production standard Mirage F1s had been authorised.

The Mirage F1 used a shoulder-mounted swept wing, instead of the delta wing of the Mirage III, which resulted in a more than fifty-percent reduction in required runway lengths and increased internal fuel tankage for forty-percent greater combat range. The approach speed prior to landing was twenty-five percent less than the preceding Mirage IIIE. Structurally the F1 airframe employed a high number of integrally-machined or chemically-milled components and honeycomb sandwich structures, and a perforated airbrake is located on the forward underside of each intake trunking. The mainplanes were of all-metal, two-spar, torsion-box construction with an extended chord on the outboard two-thirds of the leading edge, giving a dog-tooth appearance. A complex folding mechanism allowed the twin mainwheels to have a track of 2.5m yet be stowed in the fuselage. The nose leg, with its twin wheels, retracts rearwards. According to Dassault, the negative performance impact associated with the increased thickness of the Mirage F1's wing over the Mirage III's counterpart had been offset by improvements made to the propulsion system. The wing is fitted with both double-slotted trailing edge flaps and full-span leading-edge slats, the latter being automatically operated to reduce the aircraft's turn radius during combat.

A key area of advancement on the Mirage F1 over its predecessors was in its onboard avionics. The Thomson-CSF Cyrano IV monopulse radar system, developed from the Cyrano II unit installed on the Mirage IIIE, served as the main sensor and operated in three different modes: air-target acquisition

Left: The F1's wings were fitted with both double-slotted trailing edge flaps and full-span leading edge slats. (Dassault)



Right: The Mirage F1C, the interceptor version for the French Air Force. (Dassault)

and tracking, ground mapping, and terrain avoidance. The later Cyrano IV-1 model also provided for a limited look-down capability. The Cyrano IV radar was capable of detecting aerial targets at double the range of earlier models. The standard production Mirage F1 was furnished with an Instrument Landing System (ILS), radar altimeter, UHF/VHF radio sets, and LMT ARN52C and LMT NR-A1-A IFF, Tactical Air Navigation system (TACAN) and a ground data link. Other avionics include a SFENA 505 autopilot, a yaw damper, and an SFIM spherical indicator with ILS pointers. The Mirage F1 was powered by a single SNECMA Atar 9K-50 turbojet engine, giving the aircraft a maximum speed of 1,453mph, and an altitude ceiling of 65,615 feet. The engine intakes had distinctive moveable inlet half-cones known as 'souris' (mice) found on other Mirage types to provide variable inlet operation. There was a small spring-loaded auxiliary inlet under each engine intake. Sets of internal fuel tanks were arranged around the engine bay.

The aircraft also featured a detachable IFR probe, and aircraft so fitted required an 8cm plug immediately ahead of the cockpit. The pilot had a Sextant Avionique VE 120 HUD, and FICR pilots sat on a SEM Martin-Baker FIRM4 Mk 4 ejector seat, whilst F1Cs crew saw the older SEMMB FIRM4 seats being replaced by the Mark 10. An improved engine, initially known as the Super Atar and later as the SNECMA M53, was intended eventually to be adopted on production Mirage F1s, as well as for successor aircraft. The initial armament of the Mirage F1 was a pair of internal 30mm DEFA 553 cannons with 135 rounds per gun, and a single Matra R530 medium-range air-to-air missile, which was carried under the fuselage. It could carry a total combined payload of 13,889lb of bombs and missiles, all of which would be carried externally on its seven pylons. From 1979, the medium-range R530 was replaced by the improved Matra Super 530 F missile as the latter came into service in quantity with

Below: Mirages on the Dassault production line. (Dassault)



the French Air Force. In 1977, the R550 Magic was released; the Mirage F1 carried these missiles mounted on rails on the wingtips. Around the same time, the American AIM-9 Sidewinder was also introduced to the Mirage F1's armament as both the Spanish and Hellenic Air Forces had requested the integration of the Sidewinder upon their own Mirage F1CE and Mirage F1CG fighters. The F1s could also carry MATRA LR F4 rocket pods, BAP 100 anti-run bomblets, BAT 120 anti-armour bomblets and MATRA BLG-66 Belouga CBU's. Also available to the F1 was the Nord AS30L missile and the MATRA Armat, a modernised version of the Martel missile. Iraqi F1EQs were fitted with the Agave radar to make them compatible with the Exocet anti-ship missile. For self-protection the F1 carried either a Thompson CSF BF or Thompson-CSF SHERLOC RWR, the former denoted by its bullet fairing on the tailfin and the latter by recognisable rectangular housings in the fore and aft positions. Most F1s had horizontal antennae on their fins for the SOCRAT 6200 VOR/ILS. The aircraft could also carry a Phimat pod with up to 210 chaff packs triggered manually or automatically, a Barem jammer, and a Lacroix flare dispenser in place of a braking chute, as well as an Alkan Corail chaff and flare dispenser, with further chaff and flare dispensers being fitted to the fuselage sides. The F1CT was fitted with a Thompson TRT TMV 630 laser rangefinder and the F1CR could carry the Raphael 2000

SLAR pod and a SAT SCM2400 Super Cyclope IRLS to support the three cameras in a bulged housing under the nose.

One of the more interesting aspects of the Mirage F1 story was that in the 1970s one aircraft was built with the aforementioned SNECMA M53 afterburning bypass turbojet, providing 83.4kN (18,740lbf) afterburning thrust. The fit of the M53 demanded structural changes, larger inlets, and heavier landing gear. The external appearance was generally the same, though the fuselage was stretched by nine inches and empty weight increased by a little over eight-percent. Avionics included a Cyrano IV-100 radar, a SAGEM/Kearfott SKN2603 INS, and a HUD. The machine was originally designated the F1E - 'E for Europe' until that designation was passed off to the export multirole variant - and then Mirage F1.M53. The initial flight of this one-off aircraft was on 22 December 1974. The Mirage F1.M53 may have originally been simply an engine testbed, but it was seen as a possible contender for a requirement that had been issued by a number of Western European nations to obtain a replacement for the F-104 Starfighter, then in widespread service but facing obsolescence. Dassault had even reserved designations for the aircraft - F1EB for Belgium, F1ED for Denmark, F1EN for the Netherlands, and F1FV for Norway. However, this 'sale of the century' was won by the F-16, and work on a second Mirage F1.M53 prototype, which was to be fitted with full multirole combat avionics kit, was abandoned.





MIRAGE F1 VARIANTS IN FRENCH SERVICE

The French Air Force placed a production order for the Mirage F1C interceptor variant in 1969, the 'C' standing for *Chasse* (fighter). The first of the three pre-production machines

marked 'Super Mirage F1', performed its initial flight on 20 March 1968, with Jean-Marie Saget at the controls. The second took to the air on 18 September 1969, with the third following on 17 June 1970. The first pre-production machine now resides in the *Musee de l'Air* at Le Bourget. The type reached

Above: A Mirage F1CR taxis out.

initial-operating service in 1974. Although the AA F1C was primarily intended as an interceptor, it did have a secondary ground-attack capability. The service eventually obtained 162 F1Cs. The seventy-first aircraft introduced a Thomson-CSF BF RWR with antennas in the tail, while the eighty-fourth introduced an eight-centimetre forward fuselage plug directly in front of the cockpit to accommodate a removable fixed IFR probe, offset to starboard. The F1Cs with the refuelling probe were designated 'Mirage F1C-200', and they were intended for expeditionary deployments. The Air Force also obtained sixty-four Mirage F1CR reconnaissance aircraft, with the type entering service in 1983. Also procured were twenty tandem-seat Mirage F1 trainers.

The Mirage F1A was intended for sunny tropical climates where weather was rarely any obstacle to flying combat missions, and featured a slender nose and a lightweight Dassault Electronique Aida II radar, usually described as a 'ranging radar', though it actually was a fairly capable set, with multiple modes for air-to-air and air-to-ground combat. It was limited by a fixed antenna with a narrow field of view, and only moderate range. It also carried a retractable inflight refuelling probe that extended to the starboard side of the nose. A clear-weather *Système d'Attaque au Sol* (Ground Attack System) integrating a Thomson-CSF TMV-630 laser rangefinder in a neat fairing under the nose, with inertial navigation avionics, digital processors, plus cockpit head-up-display (HUD) and head-down moving map display, was also carried. Since the F1 had originally been designed as a multirole fighter and was 'shoehorned' into *Armée de l'Air* service as

Above left: The Mirage F1B was a two-seat trainer version.

Left: Early Mirage F1s were camouflaged for air defence duties.





Above: Mirage F1 armed with LGBs. (Luc Colin)



Left: Mirage F1CR with practice bomb on the centreline. (Luc Colin)



an interceptor, there wasn't much difference between the F1C and the F1E series, except for the enhanced Cyrano IVMR radar fitted to the F1CR reconnaissance variant. In fact, some export users obtained F1Es that were designated F1Cs, and to be even more confusing, some export machines with an F1A designation were F1Es as well.

The Mirage F1C was fitted with a long nose radome like that of the Mirage 50 delta wing fighter, although the initial prototype had featured the blunter radome of the Mirage IIIE. The aircraft was powered by a single SNECMA Atar 09K50 afterburning turbojet, derived from the Atar 09K used on the twin-engine Dassault Mirage IV bomber. The pilot sat under a clamshell canopy that hinged up towards the rear, on a French-built Martin-Baker Mark 4 ejection seat, which fired through the canopy. The Mark 4s would later be upgraded to Mark 6 standard by the installation of a rocket boost system or were replaced by the zero-zero Mark 10. Cockpit avionics were primitive by modern standards. The basic kit included a TACAN beacon-navigation system, a radar altimeter, a simple datalink for ground-controlled interceptions, an instrument landing system, a VHF-UHF radio, and an identification friend or foe (IFF) transponder. A Thomson-CSF Cyrano IV multimode monopulse was fitted, the Cyrano IV being an improved version of the Cyrano II used in the Mirage III, with about twice the range. The Cyrano IV-0 variant initially fitted to the F1C was solely an air combat radar, with a single-target engagement capability, but it was successively upgraded to the Cyrano IV-1, with moving target indicator (MTI) capability to provide 'look down' capability for spotting aircraft flying low in ground clutter, and the Cyrano IV-2, with limited air-to-ground capability, and finally, the

Centre left: A Mirage F1CR with practice bomb carrier on the centreline. (Luc Colin)

Left: A Mirage F1C on the ground at Nellis AFB during a Red Flag exercise.



Above: A pair of Mirage F1Cs – close up.
(Armée de L'Air)

multirole Cyrano IVM with track-while-scan capabilities and improved ground attack capabilities. Although the F1C was fitted with the long nose radome the initial prototype had featured the blunter radome of the Mirage IIIE. The BF RWR fitted to later F1C production aircraft had pen-style fairings in the front and back of the tail fin. The BF provided an audio warning and gave the general direction of the threat using a set

Below: A Mirage F-1C with Paveway LGB.
(Patrick Martin Collection)

of dashboard display lamps. It had a limited ability to indicate general classes of radars.

No built-in countermeasures systems were included at the outset, but a Phimat chaff-flare dispenser could be carried under one wing, with an active jammer pod carried under the other. The Phimat chaff-flare pod could be, and apparently often was, replaced by a Lacroix flare dispenser fitted into the brake parachute fairing, replacing the parachute. Improved chaff-flare dispensers were introduced, most significantly the Matra

Corail dispenser, in the form of a gondola that could be fitted conformally under the wing next to the fuselage. A range of jammer pods were carried, though sources are confused on the details. It appears that *Armée de l'Air* machines originally carried the Dassault Barax jammer pod, which was later replaced by the more capable Thomson-CSF Barracuda pod. Built-in armament consisted



Right: A Mirage F1CR with long range tanks fitted.

Below right: The F1C was fitted in a long nose radome like that of the Mirage 50. (*Armée de L'Air*)

of twin DEFA 30mm revolver-type cannon, firing out of the belly just aft of the engine intakes, loaded with a maximum of 135 rounds per gun. There was a centreline stores pylon rated at 2,100 kilograms and a pylon under each wing with all three of these pylons being 'wet' to permit carriage of external tanks. A short 'dry' pylon could be fitted under each outer wing, with these pylons often carrying countermeasures pods as described above, and there were launch rails for Matra 550 Magic heat-seeking air-to-air missiles on the wingtips, giving a total of seven stores stations. Multiple ejector racks could be fitted to the centreline and main wing pylons to increase the number of munitions carried. F1Cs were also able to carry the SECAPEMPR-53 or TAC-100 pods, which deploy sleeve targets.

The F1C was designed to be easy to maintain and quick to turn around between sorties. Initially, flight availability rates were unimpressive, but the bugs were worked out in a few years, and the type acquired a good reputation for reliability. In French service, the F1C was generally painted in an air superiority colour scheme, with dark blue-grey on top over light grey undersides. During African deployments, the dark blue-grey was traded for sand/chocolate disruptive patterns on top better suited for the desert environment.



The Mirage F1CR was intended for reconnaissance with a secondary attack role, and was generally outfitted along the lines of a late-configuration F1C-200, with a refuelling probe, BF RWR, and SEMMB Mark 10 zero-zero ejection seats fitted from the outset. It featured a hatch with a port under the nose for a Thomson-TRT 40 panoramic or a Thomson TRT-33 vertical film camera, and an SAT SCM2400 Super Cyclope infrared linescan (IRLS) imager, fitted into the bottom of the starboard engine nacelle, although one of the DEFA cannons had to be removed to accommodate it. The IRLS could provide real-time imagery to a ground station over a line-of-sight datalink. From 1984, all French Air Force F1CR squadrons were equipped with the transportable SARA (*Système d'Aertransportable de Reconnaissance Aérienne*) ground analysis station, consisting of eight shelters. The Mirage F1CR often carried a Thomson-CSF RAPHAEL-TH (*Radar de Photographie Aérienne Electrique a Transmission Hertziennne*) side-looking airborne radar (SLAR) pod on the centreline pylon, which could also relay real-time data to a ground station along with the ASTAC ELINT pod, the DESIRE pod and the RP35P optical reconnaissance pod. The F1CR was originally fitted with Cyrano IVM radar, which was then upgraded to the Cyrano IVMR variant - similar to the Cyrano IVM but with enhanced ground attack and low-level navigation capabilities - and a SAGEM ULISS 47 inertial navigation system (INS).

The first Mirage F1CR flew on 20

Above left: The F1s armament consisted of two DEFA 30mm revolver-type cannons.

Left: The F1s were also armed with Matra 530 and 550 air-to-air missiles.



Above: As the F1 had originally been designed as a multirole fighter it was 'shoehorned' into French service as an interceptor. (Patrick Martin Collection)



Left: The F1 has worn a number of special schemes during its service life.

November 1981. This variant was retrofitted with a FLIR in the port gun bay, providing imagery to a new HUD. They also gained the MATRA Corail underwing chaff and flare containers, partly to replace the earlier fit of flares in the brake chute housing. Also carried were Phimat pod and Barax pods. The improved attack and navigation systems gave the F1CR a fairly potent secondary ground attack capability, which the *Armée de l'Air* would make good use of. An array of unguided ground-attack munitions could be carried, including SNEB 68-millimeter rocket pods, various iron bombs, parachute-retarded Belouga cluster bombs, Durandal rocket-boosted runway breaker bombs, sticks of BAT 100 runway breaker bombs, or sticks of BAP 120 anti-armour fragmentation bombs. One particularly interesting store was the CEM-1 multistore carrier, which featured an eighteen-



Left: Mirage F1CR 610 24.NQ of EC 4.33 seen here at Bagotville. (Patrick Martin Collection)

Below: Mirage F1CR of EC 4.33 in desert colours. (Patrick Martin Collection)





Above: Mirage F1CR of EC 1-30 at Bangui. (Patrick Martin Collection)



Left: The Mirage F1CR was used in French 'out of area' operations. (Patrick Martin Collection)



round 68mm unguided rocket launcher on the front and a tray on the back for two Durandals or six BAT 100s. Smart weapons, such as the AS-37 ARMAT anti-radar missile, carried on the centreline pylon, or laser guided bombs or the AS-30L laser-guided missile, which required carriage of the ATLIS laser target designation pod on the centreline pylon could also be carried. A total of sixty-four Mirage F1CRs were ordered by the French Air Force, and the first air force unit equipped with the CR was *Escadron de Reconnaissance 2/33*, which became operational in September 1983.

The Mirage F1CT was a ground attack version of the Mirage F1C. Following their replacement in the air defence role by the Mirage 2000, the French Air Force had a number of surplus Mirage F1Cs available, and in 1988 it launched a conversion programme to turn these aircraft into interim ground attack aircraft to replace elderly Mirage IIIEs and Mirage Vs. The Mirage F1CT program brought the avionics of the F1C up to the standard of the F1CR, with the radar upgraded with the additional air-to-ground modes of the Cyrano IVM-R, an improved SAGEM ULISS 47 internal platform, a Dassault Electronique computer and Thomson VE120 HUD, a Thomson TMV630A laser rangefinder beneath the nose, a Thomson-CSF SHERLOC TMV630A RWR, chaff and flare dispensers, and a secure radio. The cockpit was rebuilt and the wings strengthened and modified to fit outboard pylons, whilst the port cannon was removed to make space for additional equipment like a FLIR, and the entire airframe was rewired. Strengthening the centreline pylon also allowed for the



Centre left: A Mirage F1B of CEAM. (Patrick Martin Collection)

Left: A Mirage F1C with dummy missiles taxis out. (Patrick Martin Collection)



Above: Front starboard quarter view of Mirage F1B, 503/33-FG, from EC.3/3 'Lorraine' at RAF Leuchars in September 2001. (Des Brennan)

carriage of the large 2200lt tank, originally developed for the Iraqi Mirage F1EQ. The aircraft was fitted with new Mk 10 ejection seats, while improved radar detection and warning devices, chaff/flare dispensers, and secure radios were also added. It gained the ability to carry a variety of air-to-ground weapons, including rockets, cluster bombs and laser-guided bombs, while retaining the F1C's air-to-air armament. Two

prototypes were converted by Dassault, the first flying on 3 May 1991, with a further fifty-five converted by the workshops of the French Air Force at Clermont Ferrand by 1995.

The Mirage F1B conversion trainer, (B for 'Biplaces') had tandem seats, each under a rear-hinging clamshell canopy, and the fuselage was stretched 30cm to accommodate the second cockpit. Fuselage fuel tankage was reduced as well, and cannon armament was deleted, though Dassault CC-420 cannon

Pods, with a DEFA 30mm cannon and 180 rounds could in principle be carried on underwing pylons. It was also fitted with Cyrano IV radar and the type was regarded as combat capable. The aircrew sat on Martin-Baker Mark 10 zero-zero ejection seats. The Mirage F1B did not have an IFR capability, but it could be fitted with a dummy probe for tanker training.

Below: Mirage F1C at Istres in the company of a Mirage IV. (Patrick Martin Collection)





Above: A Mirage F1C taxis out at N'Djamena. (Armée de L'Air)

FRENCH MIRAGE F1s IN COMBAT

During 1984, the first operational deployment to be performed by French Air Force Mirage F1s was conducted during 'Operation Manta', the French intervention in Chad to counteract the growing Libyan encroachment in the region. A force of four Mirage F1C-200s provided air cover for a further group of four Jaguar strike aircraft, and they also participated in a number of skirmishes against pro-Libyan Transitional Government of

National Unity (GUNT) rebels. On 16 February 1986, French Mirage F1s were redeployed to Chad as part of, 'Operation Epervier.' A flight of four F1C-200s provided fighter cover for a strike package of eight Jaguars during the air raid against the Libyan airbase at Ouadi Doum, on 16 February. A pair of F1CRs from ER 33, wearing the new African camouflage scheme, also conducted pre-strike and post-strike reconnaissance missions. Two Mirage F1s transferred to N'Djamena on 17

February, and six more the next day. The Mirage presence had grown further by early 1988 to twelve F1Cs from ECs 5, 12 and 30, and two F1CRs, with seven of this total remaining until 1990 when they were replaced by Mirage 2000s. 'Operation Salamandre' between August and October 1990 included the deployment of an F1C and a Transall tanker to Djibouti.

For 'Operation Manta' four Mirage F1Cs and four SEPECAT Jaguars were deployed from Gabon to N'Djamena, the capital of Chad, on 21 August 1983. Initially the detachment was assigned to escorting French transport aircraft and were not involved in Libyan raids in the north of the country. However, on 25 January 1984 a Mirage was damaged and a Jaguar shot down. The force was finally withdrawn on 25 September. 'Operation Epervier' was launched on 16 February 1986, when twelve Jaguars with four Mirage F1s from EC 5 for top cover attacked the Libyan airfield at Wadi Doum in northern Chad. Mirage F1CRs from EC 33 provided reconnaissance support wearing the latest desert colours. Two F1s were transferred to N'Djamena on 17 February, followed by six more the following day. Jaguars made a further raid on Wadi Doum on 7 January. Mirage F1Cs again provided cover, and the F1CRs conducted more pre-strike and post-strike reconnaissance. The detachment remained on station with varying numbers of aircraft until replaced by Mirage 2000s in 1990.

As a precursor to the 1991 Gulf 5. came 'Operation Salamandre', accomplished between 10 August and 5 October 1990, when Mirage F1s were sent to reinforce Djibouti. EC 12 then provided F1Cs for 'Operation Meteil' after a request from the UAE to boost its defences. EC 1/12 arrived at Doha on 17 October with an initial eight aircraft, and EC 3/12 arrived on 18 December with another

Above left: A Mirage F1C get airborne from N'Djamena. (Armée de L'Air)

Left: A Mirage F1C flies low level during Operation 'Manta'. (Armée de L'Air)



Right: A pair of F1CRs conducted pre and post-strike reconnaissance missions during Operation 'Manta'. (Patrick Martin Collection)

Centre right: A force of four Mirage F1C-200s provided air cover during Operation 'Manta'.

eight. EC 2/12 deployed to Qatar on 15 March with another eight aircraft. The French involvement in the Gulf 5. began on 16 September 1990 under the aegis of 'Operation Daguet' with, amongst other aircraft, four F1CRs from ER 33. One aircraft was lost in a fatal accident on December 7 and was replaced. The F1s were grounded when hostilities broke out in fear they would be mistaken for Iraqi F1EQs, and the fact they lacked compatible night vision equipment. However, once air superiority was established the aircraft returned to the fighter-bomber role on 26 January, leading Jaguar raids and carrying 250kg bombs, Barax and Phimat pods, as well as Magic AAMs. On 5 February radar reconnaissance resumed and a further two F1CRs arrived two days later. By the end of February, the F1CRs had flown 114 missions, including fifty-one reconnaissance sorties, covering bombed bridges over the Euphrates and surveying areas for French ground forces. These aircraft returned to France in early March 1991. Four Mirage F1CRs were soon back in the Gulf on 25 July 1991 as part of 'Operation Aconit', along with US and UK forces, to protect the Kurdish people of northern Iraq. A further four aircraft were soon added, flying up to four sorties a day using cameras and SLAR pods.

During March 2011, EC 2/33s Mirage F1CRs were deployed to Solenzara Air Base, Corsica, and conducted reconnaissance missions over Libya as part of 'Operation Harmattan'. In 2013 EC 2/33 F1CRs also participated in 'Operation Serval' in Mali. On 10 January the first French air intervention mission against Islamist rebels in Mali, was undertaken by F1CRs and Mirage 2000Ds, launching from their base in N'Djamena in

Right: French Mirages took part in the 1991 Gulf 5. as part of Operation 'Daguet'. (Tim Darrah)

Below: A Mirage F1C is armed during Operation 'Daguet'. (Armée de L'Air)





Left: A Mirage recce-configured F1CR in the Gulf 5. (Tim Darrah)



Below left: Mirage F1CRs await their next mission during the Gulf 5. (Tim Darrah)



Centre left: On the ground at Incirlik are this tired looking pair of Armée de l'Air F1s. (Tim Darrah)



Chad, supported by a French Air Force C-135K tanker. The EC 2/33 F1CRs provided valuable information for strike aircraft flying the next day from France. Later on the 16 January, two EC 2/33 F1CRs, were deployed from Chad to Bamako, Mali. Both aircraft were fitted with extra-long range 2,200lt ventral tanks, and when operating over Mali also carried two 250kg unguided bombs, plus their one internal 30mm cannon, in case they were called on for close air support missions. In order to replace the elderly F1CRs of EC 2/33s, a number of Rafales were outfitted with an advanced reconnaissance pod.

The Armée de l'Air's last Mirage F1 fighters were retired from operational service on 13 June 2014. The last units in service, eleven single-seat Mirage F1CRs and three two-seat F1Bs, were transferred to storage, and six aircraft performed a final appearance in a flypast during Bastille Day celebrations over Paris prior to their disposal.

Armée de l'Air Mirage F1 Units

5e Escadre de Chasse

Escadron de Chasse 1/5 'Vendée'
Escadron de Chasse 2/5 'Île de France'

10e Escadre de Chasse

Escadron de Chasse 1/10 'Valois'

12e Escadre de Chasse

Escadron de Chasse 1/12 'Cambresis'
Escadron de Chasse 2/12 'Cornouaille'
Escadron de Chasse 2/12 'Picardie'
Escadron de Chasse 3/12 'Cornouaille'

13e Escadre de Chasse

Escadron de Chasse 1/13 'Artios'
Escadron de Chasse 1/13 'Normandie Niemen'
Escadron de Chasse 2/13 'Alpes'
Escadron de Chasse 3/13 'Auvergne'

30e Escadre de Chasse

Escadron de Chasse 1/30 'Valois'
Escadron de Chasse 2/30 'Normandie Niemen'
Escadron de Chasse 3/30 'Lorraine'
Escadron de Chasse 4/30 'Vexin'

35 Escadre de Reconnaissance

Escadron de Reconnaissance 1/33 'Belfort'
Escadron de Reconnaissance 2/33 'Savoie'
Escadron de Reconnaissance 3/33 'Moselle'

Centre d'Expériences Aériennes Militaires

Escadron de Chasse 24/118 and Escadron de Chasse 5/330 'Cote de Argent'

Centre d'Essais en Vol

Centre d'Instruction Tactique 339

Above left: A Phimat pod under the wing of a French F1 at Incirlik. (Tim Darrah)

Left: Mission marking on an Armée de l'Air F1 at Incirlik. (Tim Darrah)



Above: A Spanish Mirage F1 is prepared for flight. (Patrick Martin Collection)



Left: One of Spain's two-seat Mirages F1s. (Patrick Martin Collection)

MIRAGE F1 EXPORT VERSIONS

Spain

In June 1975, with tension growing with Morocco, Spain decided to strengthen its Air Force and bought fifteen Mirage F1s, which were allocated to Albacete AB under the local designation C.14A. In mid-1976 there was still some tension with Morocco and Algeria and with Libyan MiG-25 flights on the Mediterranean, which would lead the Spanish Air Force to purchase ten more Mirage F1s and two years later to order forty-eight Mirage F1s and F1Es (C.14B) and six F1BE (CE.14A) trainers. These versions all had VOR/ILS and BF RWR aerials. The C.14As and CE.14As were delivered in a sand, brown, green, and light grey scheme, whereas the C.14Bs were in French air defence blue/grey. Weaponry included Matra 550 and Matra Magic AAMs, with a CC-420 30mm cannon pod and CEM-1 multi-store dispensers, plus BAP-100 and Durandals. The F1Es had flare dispensers scabbled to each side of the lower fuselage.

Some years later Spain also bought twelve F1EDA/DDAs retired from the Qatari Air Force, which donated some equipment and weapons used by their Mirage F1s. In Spanish service the F1E was known as the C.14A, the F1EE was the C.14B and the two-seater F1EDA as the C.14C. They served as Spain's primary air defence interceptors, with interdiction as a secondary role until they were superseded by EF-18A Hornets. They served with *Ala 11* (11th Wing) in Manises (ex-Qatari aircraft), *Ala 14*



Centre left: Mid-life Spanish F1s wore a three-tone camouflage scheme (Patrick Martin Collection)



Left: A two-seat Spanish Mirage F1. Note the wing and centreline mounted gun pods. (Patrick Martin Collection)

Right: Spanish Mirage F1s were deployed to Lithuania as a part of NATO's Baltic Air Policing mission.

Centre right: In later life, Spanish Mirage F1s wore an overall light grey scheme.

in Albacete, and *Ala 46* at Gando in the Canary Islands. *Ala 46* used their Mirage F1s mainly in the air defence role, featuring the same deep blue colour pattern as French aircraft. In October 1996, Thomson-CSF was awarded a contract to upgrade forty-eight F1C/E single-seaters and four F1EDA trainers to Mirage F1M standard. The ex-Qatari Mirage F1s, being a different version, were excluded from the upgrade, and were the first to be retired. As well as a service-life extension, this upgrade improved the avionics and added anti-shiping capability with a modernised Cyrano IVM radar and Exocet compatibility.

All Spanish aircraft carried the BF RWR, and the F1EEs featured a nav-attack suite and refuelling probes. The Spanish F1s carried Matra Super 530s and Sidewinders, and they also carried the CC-420 30mm cannon pod, LGBs, and the Syrel ELINT pod, and had chaff and flare dispensers scabbled onto each side of the lower rear fuselage. From July 2006 to November 2006, Spanish Mirage F1s were deployed to Lithuania as a part of NATO's Baltic Air Policing mission, and during this deployment they were scrambled twice to intercept undisclosed intruders.

By 2009, there were thirty-eight F1Ms in service with *Escuadrón 141* (141st Squadron) 'Patanes' and *Escuadrón 142* (142nd Squadron) 'Tigres' of *Ala 14*. In 2013, the Spanish Air Force retired its fleet of Mirage F1s, having progressively phased the type out of service as increasing numbers of the Eurofighter Typhoon had become available. Argentina wanted to purchase surplus Spanish F1s in October 2013, but the deal was scrapped in March 2014 after pressure from the United Kingdom on Spain to not assist in FAA modernisation over tensions between the countries over

Right: A 'tiger-tailed' two-seat Spanish Mirage F1BE. (Patrick Martin Collection)

Below: A Spanish Mirage F1 in its original French style camouflage colours. (Patrick Martin Collection)



Right: Note the false canopy under the nose of this Spanish Mirage F1.

Centre right: Spanish Mirage F1 with Syrel pod.

the Falkland Islands. In November 2017, Draken International announced that it had acquired twenty-two FIMs from Spain and would refurbish and upgrade them for use as adversary aircraft.

Ecuador

Unable to buy the IAI *Kfir*, which it preferred, due to the US embargo of the J79 engine, Ecuador turned to Dassault for Mirage IIIs, eventually announcing the purchases of the Mirage F1 in late 1977. Thus, between 1979 and 1980, Ecuador received sixteen F1JAs (a variant of the F1E) and a pair of F1JEs. The Ecuadorian Air Force's (FAE) squadron of Mirage F1JAs (*Escuadrón de Caza 2112*) went into action in January–February 1981 during the brief Paquisha War between Ecuador and Peru, less than two years after the aircraft had been delivered to the FAE. At that time, the Ecuadorians decided against directly challenging the Peruvian Air Force (FAP), whose Mirage 5Ps and Sukhoi Su-22s were providing air cover to Peruvian heliborne operations within the combat zone. Instead, the Mirages were kept at a distance, performing combat air patrols (CAPs) on the fringes of the combat area, in case the border clashes escalated into wider hostilities. During one incident, a Peruvian Sukhoi Su-22 was intercepted and a single air-to-air R.550 missile was launched, however, it failed to strike the Peruvian aircraft.

In 1995, during the Cenepa War, the Ecuadorian Mirages went back into action against Peru. This time, while the bulk of the squadron was kept back at Taura AFB, a small detachment of Mirage F1s and Kfir C.2s was deployed to undisclosed forward air bases to dissuade Peruvian attack aircraft from entering the combat zone. By this time, the aircraft had been upgraded with Israeli electronics and Python Mk III air-

Right: A Spanish Mirage C.14. (Patrick Martin Collection)

Below: An Ecuadorian Mirage F1JA. (Patrick Martin Collection)



Right: Between 1979 and 1980, Ecuador received sixteen F1Jas.

Below right: An Ecuador Air Force Mirage F1JA in flight.

to-air missiles, usually mounted on the outer underwing pylons, and Matra R550 Magic AAMs on wing-tip launch rails. The aircraft were also now able to carry Israeli P-1 bombs. On 10 February 1995 a pair of Mirage F1JAs, piloted by Maj. Raúl Banderas and Captain Carlos Uzcátegui, were directed over five targets approaching the combat zone in the Cenepa valley. After making visual contact, the Mirages fired their missiles, claiming two Peruvian Su-22Ms shot down, while a Kfir claimed a further A-37B Dragonfly. Sources in Peru, however, deny the claim that the Sukhoi's Su-22Ms were shot down by Ecuadorian aircraft, stating that one was shot down by Ecuadorian anti-aircraft artillery fire during a low flying ground-attack mission, while the second was lost because of an engine fire. In 2011, all of the remaining Ecuadorian Mirage F1s still in service were retired after having flown more than 33,000 flight hours during their thirty-two years in active service. They were replaced by a squadron of Atlas Cheetah's purchased from South Africa.



Iraq

During the late 1970s, Iraq placed an order for a variant of the Mirage F1, designated as the Mirage F1EQ-4. These aircraft were specially modified for extended range to perform strike missions and were dissimilar to any of the models operated by the French Air Force. During this period, France was a major supplier of military equipment to the nation,



and in 1983 loaned several Dassault-Breguet Super Étendards to Iraq while the latter was awaiting delivery of the Mirage F1EQ, which was experiencing a protracted development period and thus the delay of deliveries. The Super Étendard had been strongly advocated for by Dassault, who had feared the potential cancellation of the sizable Mirage F1 order by Iraq if the request was not granted. In 1982, it was agreed to reconfigure several of the under-order Iraqi Mirages F1s from a general combat configuration into a dedicated ground attack platform, adopting Thomson-CSF sophisticated electronic warfare equipment and a vastly increased payload capacity.

The Iraqi Mirage F1s generally carried French stores, such as the Matra Magic and Super 530, 68mm and 100mm rocket pods, Exocet and ARMAT missiles, and the AS-30L missile, along with the ATLIS targeting pod. The French cut off deliveries of the AS-30L in 1988 for a time, with the Iraqis then resourcefully qualifying the F1EQ and ATLIS pod for carriage of the comparable Soviet X29L (NATO AS-14 'Kedge') laser-guided missile. It is said that the Iraqis also fitted F1C flight refuelling probes to their MiG-23s. Iraq was also the first customer to receive the 2200lt fuel tanks.

In September 1985, an agreement was

Above left: Iraqi Mirage F1s were generally painted in sand-chocolate disruptive camouflage on top, with light grey undersides. (Tim Darrah)

Left: The Iraqi F1EQs were delivered in five blocks and were not all constructed to a common specification. (Tim Darrah)



Above: Moroccan Mirages were engaged in combat missions against the forces of the Polisario Front.

War. Iraqi Mirage F1s were generally painted in sand-chocolate disruptive camouflage on top, with light grey undersides. The Exocet-compatible aircraft were exceptions, however, featuring a maritime colour scheme of slate blue on top and light grey undersides.

Morocco

During 1975, a large order for thirty Mirage F1CHs and twenty Mirage F1EHs was placed with Dassault by the Royal Moroccan Air Force (RMAF), the first of which was to be delivered during 1978. The RMAF thus received 30 Mirage F1CHs, 14 Mirage F1EHs, and six F1EH-2000s. The aircraft were painted green, and light grey and all had VOR and BF antenna. Upon delivery, these were grouped into two squadrons, one focusing on ground-attack operations and the other upon air defence. Comprising over a third of its fighter force, the Mirage F1 served as the primary air defence fighter of the RMAF for the next two decades. As early as 1979, these aircraft were engaged in combat missions against the forces of the Polisario Front, operating in Western Sahara. The RMAF lost seven Mirages as a result of hostile fire, along with a further six that had crashed due to different mishaps. Three Mirage pilots were killed and three were captured. Morocco did not obtain any two-seaters. Moroccan F1s were generally armed with French munitions and missiles, but they did have some unique stores, including a locally-developed centreline reconnaissance pod developed by Aero Maroc Industries and Dassault, and underwing RPG tanks modified to contain the Alkan 5030 grenade launcher pod with 152 rounds. They were fitted in service with AN/ALE-40 chaff-flare dispensers and had an ECM pod fitted to one wingtip rail.

Sagem and Thales implemented a Mirage F1 upgrade program for Morocco that involved twenty-seven aircraft and featured

Left: Morocco ordered thirty Mirage F1CHs. (Patrick Martin Collection)



Right: Moroccan F1s were generally armed with French munitions and missiles, but they did have some unique stores. (Patrick Martin Collection)

engine refurbishments and upgrades, modern RDY400 radar, a digital cockpit with HOTAS controls, twin multifunction displays, a new HUD, and a threat warning display, a laser gyro GPS-INS system, a MILSTD-1553B Databus, a PAJ-FA self-protection jammer plus support for the Thales Damocles targeting pod, MICA radar-guided and heat-seeking AAMs, and the AASM smart bomb family.

Libya

Libya procured a total of thirty-eight Mirage F1s, these being the F1AD and F1BD trainer, to equip the Libyan Air Force as an air superiority fighter. The base F1AD model was a specialised strike variant that lacked the standard radar unit, and was instead outfitted with a retractable fuel probe mounted on the nose, and also had the forward tail fin extension for an HF radio antenna seen on some export versions of the Mirage III/5. Four F1ADs were subsequently upgraded into a multi-role configuration with a standard radar nose. Libyan Mirage F1s participated in the war in Chad intensively and proved their worth in the campaigns in both 1981 and 1983, although they were not used later as the



Air Force held them back for an eventual anticipated confrontation with the US and its allies. When operating in Chad, the Mirage F1AD's typical combat configuration consisted of a pair of 1300 litre drop tanks and a pair of Belouga CBU's. Operations were performed almost exclusively during daylight hours and from high altitudes, which resulted in limited effectiveness. From 1981, a detachment was deployed at Marten es-Serra in southern Libya. From 1983, these Mirage F1s were also regularly detached to Faya-

Largeau, in central northern Chad. The Mirage F1 fleet saw action during the 2011 Libyan Civil War. Following the death of General Gaddafi and the end of the civil war, France and Libya formed an agreement in 2012 to modernise the remaining Mirage F1 fleet, as well as covering the potential purchase of additional Mirage F1s that had been formerly operated by the French Air Force. Two of the radar-equipped F1ADs defected to Malta after the Libyan uprising and were subsequently repainted in the colours of the new regime and returned to service.

South Africa

During 1971, South Africa commenced its search for a replacement for the Mirage III and as a result, it chose to purchase a licence to manufacture both the Mirage F1 and its engine with the intention of producing up to 100 airframes. However, this license was quickly cancelled as a consequence of the impending 1977 arms embargo. They eventually purchased sixteen

Left: One of the original Libyan F1ADs with a retractable fuel probe mounted on the nose.

Below: An updated Libyan Mirage F1AD.





Mirage F1CZs and thirty-two Mirage F1AZs, which were quickly delivered by Dassault prior to the embargo being implemented, the first of these deliveries occurring in 1975. South Africa was one of only two overseas customers (along with Libya) who purchased the non-radar version of the F1A. Stores included French Magic AAMs and, probably, Israeli or South African ground-attack munitions. South African F1s carried the locally-built Armscor Kukri V3 AAM, very similar to the Matra Magic, and the improved Armscor Dartar AAM, along with locally-developed chaff-flare dispensers and jammer pods. VOR/ILS and BF RWRs were carried by all variants with the F1AZs having a blade aerial on the spine, to the rear of the cockpit,

replacing that under the nose of the F1CZ. South Africa also funded the design and development of the roller map and nav/weapon system. The fundamental difference between the Mirage F1CZ and AZ variants was the removal of the expensive Cyrano IV radar, this being replaced with the smaller ESD AIDA 2 target ranging radar. The AIDA radar still gave secondary air-to-air capability. Of greater value to the SAAF, especially during the later years, was the additional fuel capacity coupled with the retractable air-to-air refuelling probe. The ground attack suite consisted of the Doppler effect ESD Navigation system, Thomson CSF laser sighting, SFIM inertial control unit, Thomson

Above: South African F1s carried the locally built Armscor Kukri V3 AAM, very similar to the Matra Magic. (Patrick Martin Collection)

CSF 129 HUD, moving map display and two Crouzet/Thompson computers. This system enabled a target to be located from three miles for an automatic bomb release. Additional fuel was provided by an extra fuel tank behind the cockpit.

To counter the SAM threat to the SAAF Mirages original BF radar detector was replaced with the radar and Infra-red Misleading System better known as RIMS. This system consisted of a junction box fitted to the port rear fuselage and a dispensing pod located under each wing on station zero, although this was not popular with pilots because it created a tremendous amount of drag. The under-fuselage keels were also replaced with larger ones, which held flare/chaff dispensers. Some Mirage F1AZs also carried the ELT/555 (V)3 jamming pod under the port wing. Plans were also made to upgrade the F1 fleet by replacing the SNECMA Atar 09K50 engine with the SMR95 engine, which was based on the Klimov RD-33, and the integration of the Russian R-73 air-to-air missile. The project aircraft for this was Mirage F1AZ '216', which became known as the 'Super Mirage F1', however, this project came to an end when the SAAF withdrew the Mirage F1AZ from service.

Another project involved fitting an advanced avionics suite to Mirage F1AZ '235' - a system that was introduced to the Spanish AF Mirage F1s. Mirage '235' was given a unique white and arctic blue scheme, earning it the nickname 'the world's fastest dairy cart'.

Both F1CZ and F1AZ variants saw considerable action during operations in the Border War. In November 1978, the first five F1CZs were deployed to South-West Africa (Namibia), tasked with providing escort for reconnaissance flights over Southern Angola. From 1980, such

Above Left: South Africa initially purchased sixteen Mirage F1CZs and thirty-two Mirage F1AZs. (Patrick Martin Collection)

Left: A South African Air Force Mirage F1CZ. (Patrick Martin Collection)



Right: South African F1CZ and F1AZ variants saw considerable action during operations in the Border War. (Patrick Martin Collection)

Below right: The fundamental difference between the Mirage F1CZ and AZ variants was the removal of the expensive Cyrano IV radar. (Patrick Martin Collection)

deployments as escort aircraft became regular. Due to teething problems with the F1AZ, F1CZs were initially assigned the strike role in southern Angola using Matra M155 rocket pods or 250kg bombs. F1CZs of 3 Squadron downed two Angolan MiG-21s in 1981 and 1982. On 6 November 1981, during 'Operation Daisy', two F1CZs were vectored by GCI to intercept two MiG-21s heading south. Major Johan Rankin shot down the wingman with cannon fire, as missiles failed to lock on to the MiGs. On 5 October 1982, while escorting a Canberra of 12 Squadron on a photo-reconnaissance sortie, Major Rankin and his wingman engaged two MiG-21s on an intercept course. He fired two Magic AAMs at one of the MiGs, damaging the aircraft with the second missile. Rankin then attacked the second MiG and destroyed it with cannon fire. The first MiG was able to return to base but sustained additional damage making a belly landing. In May 1982, an Angolan Mi-8 helicopter that the SADF believed to be carrying senior officers was located and destroyed in the Cuvelai area. The helicopter was located with rotors running on the ground by a pair of F1CZs and destroyed by 30mm cannon fire.

Two F1AZs of 1 Squadron were lost over Angola. On 20 February 1988, while flying an interdiction sortie in F1AZ '245' against a road convoy during 'Operation



Hooper', Major Ed Every was shot down by a SA-13 Gopher SAM. F1AZ '223' was lost almost a month later, on 19 March, when Captain Willie van Coppenhagen flew into the ground while returning from a diversionary strike at night. Two F1AZs and a F1CZ were also damaged by enemy action but were able to return to base. On 7 June 1980, while attacking SWAPO's Tobias Haneko Training Camp during 'Operation Sceptic' ('Smokeshell'), Major Frans Pretorius and Captain IC du Plessis were both hit by SA-3 Goa SAMs. Du Plessis' aircraft was hit in a fuel line, and he had to perform a dead stick landing at AFB Ondangwa. Pretorius's aircraft sustained heavier damage and had to divert to Ruacana forward airstrip, where he landed with only the main undercarriage extended. Both aircraft were repaired and returned to service.

During the last phase of the Bush war 683 combat sorties were flown by the F1AZs, and more than 100 SAMs were fired at them. On 27 September 1987, during 'Operation Moduler', an attempt was mounted to intercept two Cuban FAR MiG-23MLs. Captain Piercy's F1CZ was damaged by either an AA-7 Apex or AA-8 Aphid AAM fired head-on by Major Alberto Ley Rivas. The explosion destroyed the aircraft's drag chute and damaged the hydraulics. Piercy was

Above left: Preserved South African F1AZ.

Left: Preserved South African Mirage F1CZ.



Above: A South African Mirage F1CZ and F1AZ in formation.

Right: A South African Mirage F1CZ armed with rocket pods.

able to recover to AFB Rundu, but the aircraft overshot the runway. The impact with the rough terrain caused Piercy's ejection seat to fire and he failed to separate from the seat and suffered major spinal injuries. In February 1987, three F1AZs fired several V-3B missiles at a group of MiG-23s without success. This was repeated again in February 1988 when a F1AZ fired a missile at a MiG-23 and fired its 30mm cannon, again without success. Various other unsuccessful attempts were made during the 1987–88 period. Apart



from operations from Namibia in July 1981, a pilot of the Mozambican Air Force defected with his MiG-17. He flew from his base near Maputo towards South Africa. Two F1AZs returning from a training exercise intercepted the MiG-17. In March 1981 two F1AZs intercepted a Zimbabwean Army CASA C-212 and forced it to land in South Africa after asserting that the aircraft had strayed into South African airspace. The SAAF lost an additional six F1AZs and three F1CZs to various mishaps. F1CZ '205' caught fire after landing and was repaired using the tail section of F1CZ '206'. After twenty-two years of service the SAAF withdrew the Mirage F1-AZ from service on 25 November 1997. In 2002 Aerosud purchased a number of retired aircraft with the intention of returning eighteen of them to service. So far, six aircraft have been sold to the Gabonese Air Force.

Greece

As in the case of Ecuador, Greece was forced by political pressure from the US into the arms of Dassault, after a refusal for a replacement for their F-102s. Thus, Greece

Above left: The Hellenic Air Force flew the Mirage F1CG.

Left: A Greek Mirage F1CG is prepared for flight. (Patrick Martin Collection)



Above: The Greek F1s were not delivered with an RWR system, however, a US-built AN/ALR-66 RWR was retro-fitted later. (Patrick Martin Collection)



Left: A Gabon Air Force Mirage F1AZ. (Patrick Martin Collection)



procured forty F1CGs. And these were delivered between 1975 and 1978. They were obtained on an urgent basis because of high tensions with Turkey, some Mirage F1Cs intended for the French Air Force being diverted to Greece instead. The Greek F1s were not delivered with an RWR system, however, a US-built AN/ALR-66 RWR was retro-fitted later. Greek F1s carried Sidewinders, with the outer wing pylons wired for that weapon, allowing a total of four to be carried. The Greeks did not obtain any two-seat aircraft, and the last Greek F1s were withdrawn in 2003. Several F1CG aircraft have been preserved for display. At least four are in Tanagra Air Base, and one more is preserved at the HAF History Department, Delta Falirou.

Gabon

Gabon received six refurbished, ex SAAF Mirage F1AZs

Left: A Congolese Air Force Mirage F1AZ 6. 30A.

Below: An IRIAF Mirage F1BQ comes in to land.





Above: An Iranian Mirage F1EQ wearing an attractive two-tone scheme. (Mark Smith)

Right: A former Iraqi Air Force Mirage F1BQ now in the colours of the IRIAF. (Mark Smith)

Congo

Congo received six refurbished, ex-SAAF Mirage F1AZs, which are reportedly no longer operational.

Iran

Iran seized twenty-four F1BQs and F1EQs flown over from Iraq, during the 1991 Gulf War. Twenty of these aircraft were refurbished to serve with the IRIAF and were reportedly equipped with locally-made radar sets.

Jordan

After being denied the F-16 by the US, Jordan purchased seventeen F1CJs, seventeen F1EJ multi-role aircraft, and two F1BJ two-seaters from Dassault. All were funded by Saudi Arabia, with initial deliveries in 1981 and final deliveries in 1983. All variants were fitted with BF RWRs, and VOR aeriels. The F1CJs were

Right: An Iraqi two-seat Mirage undergoing maintenance.

Below: An Iraqi two-seat Mirage in an attractive scheme. (Patrick Martin Collection)





Above: A RJAF Mirage F1CJ. (Patrick Martin Collection)



Left: Jordan purchased seventeen F1CJs and seventeen F1EJs. (Patrick Martin Collection)

painted in a two-tone air superiority grey scheme, while the F1EJs were painted in a three-tone disruptive desert camouflage pattern. Along with the Matra Magic and Super 530 AAMs, Jordan also obtained the AS-30L laser-guided missile.

Kuwait

Kuwait purchased thirty-seven F1CKs and six F1BK two-seaters. The Kuwaiti Mirage F1s were provided in two batches, one with initial deliveries in 1977 following a border clash with Iraq in 1973, and the second with initial deliveries in 1983. The Kuwaiti F1CKs were basically F1Es, not F1Cs. Armament included Marta 530 and Magic AAMs, Matra ARMAT anti-radar missiles, and Remora jamming pods. The F1s



Left: Jordanian F1EJs were painted in a three-tone disruptive desert camouflage pattern. (Patrick Martin Collection)

Below: A Kuwaiti Mirage F1CK armed with a Marta 530 AAM. (Patrick Martin Collection)



Right: The Kuwaiti F1s generally replaced the English Electric Lightning in service. (Patrick Martin Collection)

Centre right: A Kuwaiti F1CK with radome removed. (Patrick Martin Collection)

generally replaced the English Electric Lightning in Kuwaiti service, which the Kuwaitis had found too difficult to maintain and really not all that suitable for their needs. The early aircraft were painted in a two-tone sand colour scheme, while the later batch was painted overall light grey. At the time of the Iraqi invasion of 1990, some fifteen F1s escaped to Saudi Arabia and were painted with 'Free Kuwait' titles. No aircraft were lost during the Gulf War, and all of these aircraft were later refurbished in France. The Kuwaiti F1s were withdrawn from service in 1993, to be replaced by the F/A-18 Hornet.

Qatar

Mirage procurement by Qatar was a protracted affair beginning with an order placed in 1979. Eventually it ordered thirteen F1EDA multi-role and two F1DDA two-seater aircraft. These machines were delivered in the 1980s without refuelling probes and featured a desert camouflage scheme of dark sand and dark green on top in a disruptive pattern, with light blue undersides. They were armed with French stores, including the COR reconnaissance pod, and were operated by No.7 Squadron based at Doha. A 1987 contract was reported to have upgraded the F1 force with unspecified Mirage 2000 avionics. The Qatar Emiri air force flew operational missions during the Gulf War but these were

Right: The Kuwaiti F1CKs were basically F1Es, not F1Cs. (Patrick Martin Collection)

Below: Qatar ordered thirteen F1EDA multi-role aircraft.





Left: A Qatari Mirage F1EDA taxis out during Operation 'Desert Storm'.

Right: The Qatari Mirage F1s were delivered without an IFR probe. (Patrick Martin Collection)

Centre right: A Qatari Mirage F1EDA taxis out. (Patrick Martin Collection)

apparently limited to local air defence. Most of the F1 fleet was resold to Spain in the mid-1990s.

ATAC

In June 2017 Textron Airborne Solution's Airborne Tactical Advantage Company (ATAC) acquired sixty-three Mirage F1B, F1CT, and F1CRs from France, along with support equipment and 150 engines, for dissimilar air combat training and aggressor squadron purposes for the US Air Force. On 10 February 2022, when operating out of Lue AFB supporting the 56th Operations Group, an F1 crashed in an unpopulated area near Buckeye, west of Phoenix, Arizona, after the pilot ejected.

Draken International

In 2017, Draken International announced the procurement of twenty-two Mirage F1M and F1B fighter jets. Previously flown by the Spanish Air Force, these aircraft joined Draken's existing fleet of radar-equipped Douglas A-4K Skyhawks and Aero Vodochody L-159E fighter jets to support Draken's Nellis AFB ADAIR contract, which provides adversary training for the USAF Weapons School, Red Flag exercises, operational test support, RTU support, and Combat Air Forces abroad. On 24 May 24 a Mirage F1, callsign 'Sniper 01', operating in the adversarial role crashed near Nellis AFB, sadly killing its pilot.

Paramount Aerospace Systems

Paramount Aerospace Systems acquired four former French Air Force Mirage F1Bs to operate in the dissimilar aircraft training role in South Africa.

Right: An ATAC two-seat Mirage F1.

Below: A Draken International Mirage F1M.





Above: Spanish Air Force Mirage F1CE C.14. (Patrick Martin Collection)

MIRAGE F1 VARIANTS

Mirage F1A

Single-seat ground-attack fighter aircraft, with limited daylight-only air-to-air capability. Fitted with lightweight EMD AIDA 2 ranging radar instead of the Cyrano IV of other variants, with laser rangefinder under nose, retractable refuelling probe and increased fuel capacity.

Mirage F1AD

Mirage F1A for Libya. Sixteen delivered 1978–1979.

Mirage F1AZ

F1A for South Africa. Thirty-two delivered 1975–1976.

Mirage F1B

A two-seat operational conversion trainer. The extra seat and controls added only 30cm (12in) to the length of the fuselage, but at the cost of less internal fuel capacity and the loss of the internal cannons.

Mirage F1BD

Export version of the Mirage F1D for Libya. Six delivered 1978–1979.

Mirage F1BE

Mirage F1B for Spain, local designation CE.14A. Six delivered 1980–1981.

Mirage F1BJ

Mirage F1B for Jordan. Two built.

Mirage F1BK

Export version of the Mirage F1B for Kuwait. Two built.

Mirage F1BK-2 – A multi-role two-seater for Kuwait, equivalent to F1DI. Four built.

Mirage F1BQ

Two-seat trainer for Iraq, some of which fitted with dummy flight refuelling probe. Eighteen ordered.

Mirage F1C

Production interceptor version for the French Air Force.

Mirage F1CE

Export version of the Mirage F1C for Spain, with local designation C.14A. Forty-five delivered.

Mirage F1CG

Export version of the Mirage F1C for Greece. Forty built.

Mirage F1CH

Export version of the Mirage F1C for Morocco. Thirty built.

Mirage F1CJ

Export version of the Mirage F1C for Jordan. Seventeen built.

Mirage F1CK

Export version of the Mirage F1C for Kuwait. Eighteen built. Later upgraded to CK-2 standard.

Mirage F1CK-2

Nine multi-role aircraft, equivalent to the F-1E, were sold to Kuwait as part of a follow up order.

Below: South African Mirage F1AZ. (Patrick Martin Collection)

Mirage F1CR

Upgraded F1C for the French Air Force to replace the Mirage IIIR in the tactical reconnaissance role.

Mirage F1CT

Upgraded F1C for the French Air Force to replace the Mirage IIIE in the close air support role.

Mirage F1CT-200

Designation for F1CTs fitted with refuelling probe.

Mirage F1CZ

Export version of the Mirage F1C for South Africa. Sixteen delivered with two further aircraft received to replace aircraft lost.

Mirage F1ED

Export version of the Mirage F1C for Libya. Sixteen built.

Mirage F1D

Two-seat training version, based on the Mirage F1E.

Mirage F1DDA

Export version of the Mirage F1D for Qatar. Two built.

Mirage F1E

Single-seat all-weather multi-role fighter and ground-attack aircraft.

Mirage F1JA

Export version of the Mirage F1E for Ecuador. Sixteen built.

Mirage F1EE

Export version of the Mirage F1E for Spain. Twenty-two built.

Mirage F1EH

Export version of the Mirage F1E for Morocco. Fourteen built.

Mirage F1EH-200

Moroccan aircraft fitted with a flight refuelling probe. Six built.



Right: Royal Jordanian Mirage F1CJ. (*Patrick Martin Collection*)

Below right: French Air Force Mirage F1CR. (*Patrick Martin Collection*)

Mirage F1EJ

Export version of the Mirage F1E for Jordan. Seventeen built.

Mirage F1EQ

Export version of the Mirage F1E for Iraq. Sixteen built.

Mirage F1EQ-2

Single-seat air defence fighter version for Iraq. Sixteen built.

Mirage F1EQ-4

Single-seat multi-role fighter, ground-attack, reconnaissance version for Iraq. Twenty-eight built.

Mirage F1EQ-5

Single-seat anti-shipping version for Iraq. Twenty built.

Mirage F1EQ-6

Single-seat anti-shipping version for Iraq. Thirty built.

Mirage F1EDA

Export version of the Mirage F1E for Qatar. Twelve built.

Mirage F1CG

Greece operated forty Mirage F1CG single seat aircraft.

Mirage F1CR

A total of Sixty-four Mirage F1CRs ordered by the French Air Force.

Mirage F1CT

A ground attack version of the Mirage F1C-200. The F1CT program brought the avionics of the F1C up to the standard of the F1CR, with the radar upgraded with the additional air-to-ground modes of the Cyrano IVM-R, an improved navigation/attack system fitted, with a laser rangefinder fitted under the nose.

Mirage F1CZ

The South African Air Force (SAAF) flew both the Mirage F1AZ ground-attack version as well as the radar-equipped Mirage F1CZ fighter.

Mirage F1 M-53

Developed for the participation in the European NATO fighter competition of early seventies, seeking to replace the F-104G.

Mirage F1M

The F1M upgrade was applied to forty-eight Spanish F1CE/EE and four F1EDA trainers.

Mirage F1 MF2000

A Royal Moroccan Air Force upgrade program to modernise twenty-seven F1CH, F1EH and F1EH-200 aircraft.

Above right: A Greek F1CG in special colour Scheme. (*Patrick Martin Collection*)

Right: A Qatari Mirage F1CQ. (*Patrick Martin Collection*)





CURRENT AND FORMER OPERATORS

Gabon

The Gabonese Air Force received eight F1AZ aircraft from South Africa.

Iran

The Islamic Republic of Iran Air Force seized twenty-four F1BQs and F1EQs from Iraq.

Left: A Mirage F1C pilot taxis his aircraft out.

Below: An Armée d l'Air Mirage F1CR (Patrick Martin Collection)

Bottom: A Hellenic Air Force Mirage F1CG. (Patrick Martin Collection)





Morocco

The Royal Moroccan Air Force received thirty F1CHs, 14 F1EHs and six F1EH-200s.

Ecuador

The Ecuadorian Air Force operated sixteen F1JAs and 2 F1JEs.

France

The French Air Force received 246 aircraft.

Greece

The Hellenic Air Force operated forty F1CGs.

Libya

The Libyan Air Force received sixteen F1ADs, six F1BDs, and sixteen F1EDs.

Iraq

The Iraqi Air Force received 106 F1EQs and fifteen F1BQs, with a further four EQs and four trainers undelivered.

Jordan

The Royal Jordanian Air Force received seventeen F1CJs, seventeen F1EJs and two F1BJs.

Above: A colourful Mirage F1CR from Normandie Niemen. (Patrice Sublemontier)

Below: A Mirage F1CT with Matra Magic missiles fitted on the wingtip rails. (Patrick Martin Collection)

Kuwait

The Kuwaiti Air Force operated twenty-seven F1CKs and six F1BKs.

Qatar

The Qatari Air Force operated thirteen F1EDAs and two F1DDAs.





Left: The F1CR was originally fitted with Cyrano IVM radar, which was then upgraded to the Cyrano IVMR. (Patrick Martin Collection)

Below left: A pair of Mirage F1Cs over the Pyrenees. (Armée de L'Air)

South Africa

The South African Air Force operated thirty-two F1AZs and sixteen F1CZs.

South Africa

The Paramount Aerospace Systems acquired four former French Air Force Mirage F1Bs.

Spain

The Spanish Air Force originally received forty-five F1CEs, twenty-two F1EEs and six F1BEs, but also subsequently acquired twenty-four second-hand examples from France and Qatar.

United States

Draken International has acquired twenty former Spanish Air Force Mirage F1Ms and two F1Bs for use in the Adversary Air role.

United States

Textron subsidiary Airborne Tactical Advantage Company ATAC acquired sixty-three former French Air Force Mirage F1s, F1CTs, and F1CRs for dissimilar air combat training.

Below: A Mirage F1C with Matra 550 missile on the centreline pylon. (Patrick Martin Collection)

Mirage F1 Specifications

General characteristics

Crew: 1
Length: 15.3m (50ft 2in)
Wingspan: 8.4m (27ft 7in)
Height: 4.5m (14ft 9in)
Wing area: 25m² (270sq ft)
Empty weight: 7,400kg (16,31lb)
Gross weight: 10,900kg (24,03lb) (clean take-off weight)
Max take-off weight: 16,200kg (35,715lb)
Powerplant: 1 × SNECMA Atar 9K-50 afterburning turbojet engine, 49.03kN (11,020lbf) thrust dry, 70.kN (15,900lbf) with afterburner

Performance

Maximum speed: 2,33km/h (1,453mph, 1,262kn) at 11,000m (36,089ft)
Maximum speed: Mach 2.2
Combat range: 425km (264mi, 229nmi) hi-lo-hi at Mach 0.75/0.88 with 14 × 250kg (551lb) bombs
Endurance: 2hr 15min (combat air patrol, with two × Super 530 missiles and centreline drop tank)
Service ceiling: 20,000ft (66,000ft)
Rate of climb: 243 /s (47,800 ft/min)
Thrust/weight: 0.66

Armament

Guns: Two × 30mm DEFA 553 cannons with 150 rounds per gun
Hardpoints: 1 centreline pylon, four underwing and two wingtip pylons with a capacity of 6,300kg (13,900lb) (practical maximum load 4,000kg (8,800lb) with provisions to carry combinations of 8× Matra rocket pods with eighteen × SNEB 68 mm rockets each.
Bombs: Various
Other: Reconnaissance Pods or Drop tanks
Missiles: Two × AIM-9 Sidewinders or Matra R550 Magics on wingtip pylons, two × Super 530Fs underwing, one × AM-39 Exocets anti-ship missile or two AS-30L laser-guided missiles



Colourful Mirages

The Mirage F1 has worn several special schemes during its lifetime, and here are just a few:



Above: Mirage F1B 33-FX of EC 2-33.

Below: Mirage F1C 33-FC of EC 3-33.

Bottom: Mirage F1C 12-YA of EC 1-12 Tiger Meet scheme.





Above: Mirage F1C 30-FD of EC 3-30.

Below: Mirage F1C 5-NL of EC 1-5.

Bottom: Mirage F1C 233.



Colourful Mirages *Continued*



Above: Mirage F1C 5-01 of EC 2-5.

Below: Mirage F1C 12-Y1 of EC 1-12.

Bottom: Mirage F1CR 330-AF of CEAM.





Above: Mirage F1CR 33-NG of EC 2-33.

Below: Mirage F1C 30-QK Normandie Niemen.

Bottom: Mirage F1CR at the 2013 International Air Tattoo.



Mirage F.1B French Air Force

IN DETAIL *Photos by Patrice Sublemontier*



1

1. Mirage F1B 33-FD.
2. Forward fuselage.
3. Wing tank detail.
4. Nose gear front aspect.
5. Nose gear.
6. Rear cockpit and canopy.
7. Canopy details.



2



4



3



5



6



7



8



9



10



11

8. Rescue markings.
9. Intake detail.
10. Rear fuselage.
11. Upper tail detail.

Mirage F.1B French Air Force

IN DETAIL *continued*



12



15



18



19



20



13

- 12. Main gear side aspect.
- 13. Main gear leg.
- 14. Nose gear in close up.
- 15. Main gear door.
- 16. Rescue triangle.
- 17. Open access panel.
- 18. Braking chute housing.
- 19. Wing pylon.
- 20. Pylon detail.
- 21. Fin forward details.
- 22. Open Airbrake.



16



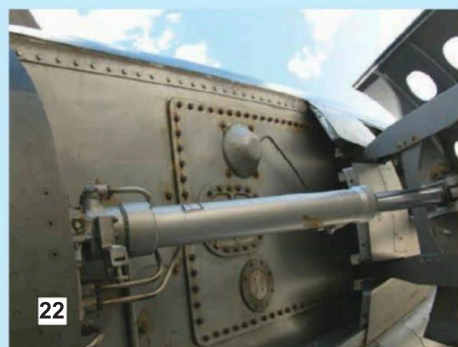
21



14



17



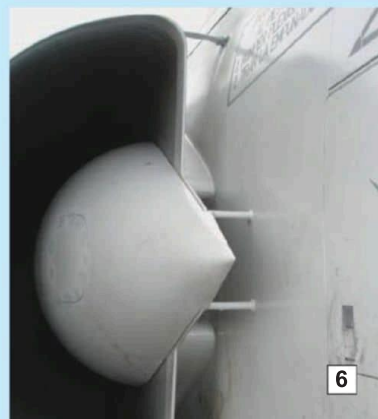
22

Mirage F.1M C.14 Spanish Air Force

IN DETAIL *Photos by Luc Colin*

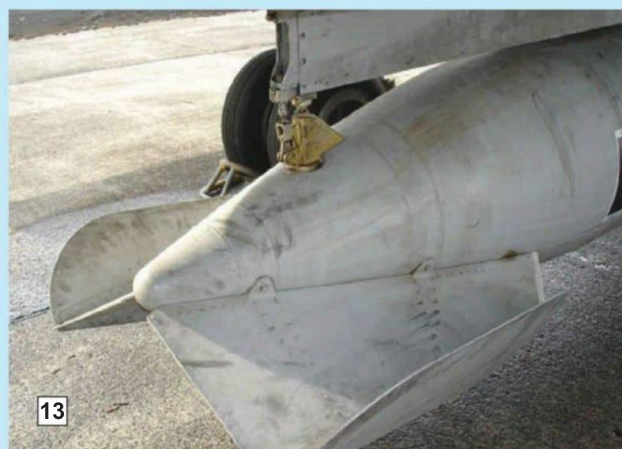


1. Mirage F.1M C.14 14-32.
2. Nose detail.
3. IFR probe.
4. Forward fuselage detail.
5. Starboard intake.
6. Port intake.
7. Intake mounted lamp.



Mirage F.1M C.14 Spanish Air Force

IN DETAIL *continued*

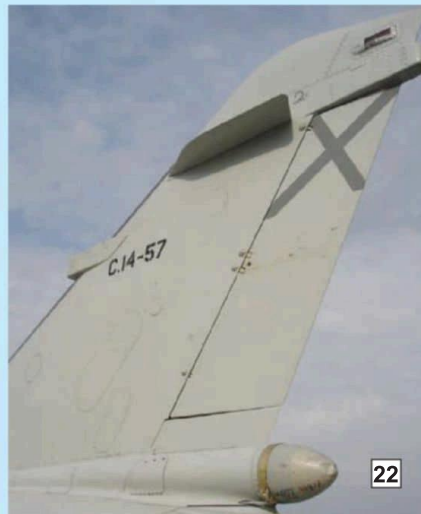




16



21



22



17



18



23



19



20

- 8. Intake and speed brake aspect.
- 9. Wing tank mid-section.
- 10. Chaff and flare dispenser.
- 11. Barax ECM Pod.
- 12. Wing tanks forward aspect.
- 13. Wing tank rear aspect.
- 14. Barax ECM pod with covers.
- 15. Main wheel bay.
- 16. Open access panel.
- 17. Engine nozzle.
- 18. Nose wheel detail.
- 19. Main wheel leg forward aspect.
- 20. Main wheel leg rear aspect.
- 21. Main wheel leg linkages.
- 22. Tail detail.
- 23. Inside the main wheel bay.
- 24. Underfuselage strake and chaff and flare dispenser.



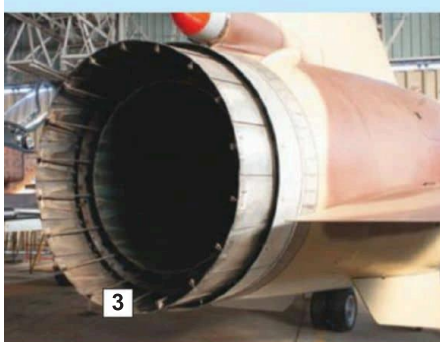
24

Mirage F1EQ-6. IN DETAIL

Preserved in the EALC Museum at Lyon Corbas

The aircraft was originally destined for the Iraqi Air Force but was embargoed and is painted in a non-standard colour scheme.
Photos by Regis Marteau

1. Nose detail.
2. IFR probe.
3. Engine nozzle.
4. Intake detail.
5. Main wheel front aspect.
6. Main wheel rear aspect.
7. Nose wheel.
8. Braking chute fairing.
9. Tail detail.
10. Cockpit area.
11. Canopy and Rescue markings details.





2^{ème} esc. Dogue

Mirage F1C, n°84, Escadron de chasse 3/12 Cornouaille, BA 103 Cambrai, September 1979.



SPA 171 Dragon

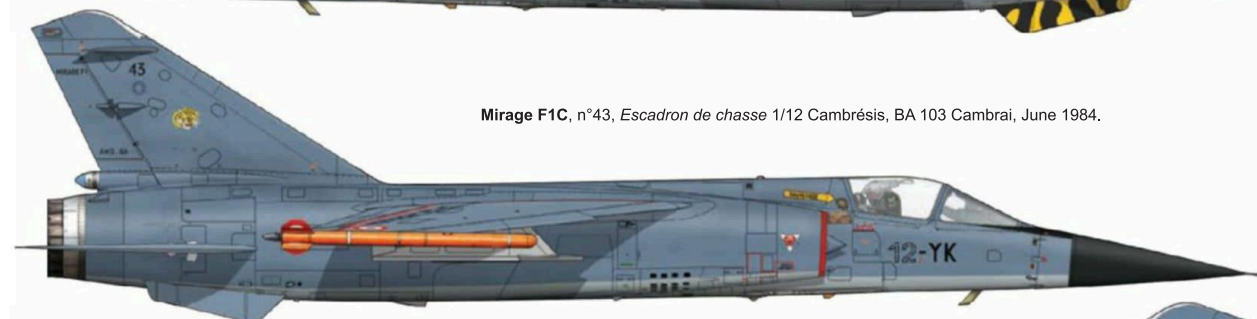
Mirage F1B, n°512, Escadron de chasse 3/5 Comtat Venaissin, BA 115 Orange-Caritat, June 1982.



Mirage F1C-200, n°237, Escadron de chasse 1/12 Cambrésis, BA 103 Cambrai, 1983.



Mirage F1C, n°43, Escadron de chasse 1/12 Cambrésis, BA 103 Cambrai, June 1984.



SPA 89 Guêpe

Mirage F1C, n°37, Escadron de chasse 1/12 Cambrésis, BA 103 Cambrai, June 1986.



Mirage F1C, n°29, Escadron de chasse 1/10 Valois, BA 110 Creil-Senlis, January 1984



SPA 84 Renard





Mirage F1C-200, n°201, *Escadron de chasse 4/30 Vexin*, BA 188 Djibouti, 1989.

ERC 3/561 Mousquetaire gris



Mirage F1CR, n°609, *Escadron de reconnaissance 3/33 Moselle*, seen at Nellis AFB for Red Flag, 1989.

BR 11 Cocotte



SAL 33
Petit Prince à la Hache

Mirage F1CR, n°634, *Escadron de reconnaissance 1/33 Belfort*, Al Ahsa, Saudi Arabia, 1991



GC II/9 Morietur

Mirage F1CT, n°245, *Escadron de chasse 3/13 Auvergne*, BA 132 Colmar-Meyenheim, 1993.



Mirage F1C, n°72, *Escadron de chasse 5/330 Côte d'Argent*, BA 118 Mont-de-Marsan, July 1995.



2^{ème} esc.
Mulhouse

Mirage F1B, n°510, *Escadron de chasse 1/30 Alsace*, BA 132 Colmar-Meyenheim, September 2001.



Mirage F1B, n°509, Escadron de chasse 3/30 Lorraine, BA 112 Reims-Champagne, 2002.



Mirage F1B, n°518, Escadron de reconnaissance 2/33 Savoie, as seen after transferring from EC 3/33 Lorraine, BA 112 Reims-Champagne, 2009.



3 ème esc.
Colmar

Mirage F1CT, n°243, Escadron de chasse 1/30 Alsace, BA 132 Colmar-Meyenheim, March 2007.



Mirage F1CR, n°615, Escadron de chasse et d'experimentation 5/330 Côte d'Argent, as seen at Luqa, Malta after refuelling during a sortie over Libya, April 2011.



SPA 164 Tigre du
Bengale



Mirage F1B, n°517, Escadron de reconnaissance 2/33 Savoie, BA 118 Mont-de-Marsan, 2013.



Mirage F1CR, n°660, Escadron de reconnaissance 2/33 Savoie, BA 118 Mont-de-Marsan, 2014.





Mirage F1EE, C.14-52, *Escuadrón 462, Ala 46, Ejército del Aire, Base Aérea de Gando, 1980s.*



Mirage F1CE, C.14-01, *Escuadrón 142, Ala 14, Ejército del Aire, Base Aérea de Albacete (Los Llanos), 1988.*



Mirage F1BE, CE.14-30, *Escuadrón 462, Ala 46, Ejército del Aire, Base Aérea de Gando, March 1989.*



Mirage F1M, C.14-70, *Escuadrón 142, Ala 14, Ejército del Aire, Base Aérea de Albacete (Los Llanos), 2005.*



Mirage F1M, C.14-15, *Escuadrón 142, Ala 14, Ejército del Aire, BAN Landivisiau, as seen at the 2008 NATO Tiger Meet.*

Mirage F1BE, CE.14-27, *Escuadrón 142, Ala 14, Ejército del Aire, Base Aérea de Albacete (Los Llanos), September 2013.*



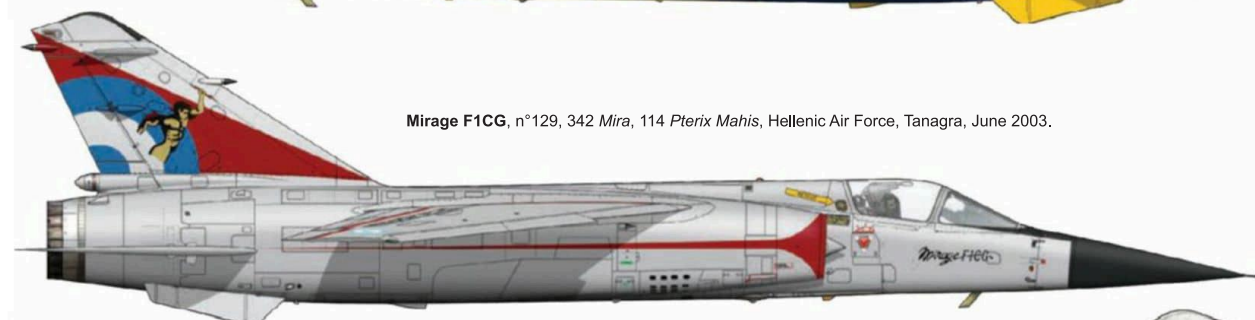
Mirage F1CG, n°107, 342 Mira, 114 *Pterix Mahis*, Hellenic Air Force, Tanagra, October 1995.



Mirage F1CG, n°115, 342 Mira, 114 *Pterix Mahis*, Hellenic Air Force, Tanagra, June 2003.



Mirage F1CG, n°129, 342 Mira, 114 *Pterix Mahis*, Hellenic Air Force, Tanagra, June 2003.



Mirage F1EH-200, n°170, Escadron de chasse Atlas, Royal Moroccan Air Force, Sidi Slimane, circa 1990.



Mirage F1EJ, 105, No. 1 Squadron, Royal Jordanian Air Force, Muwaffaq Salti Air Base, 1983.



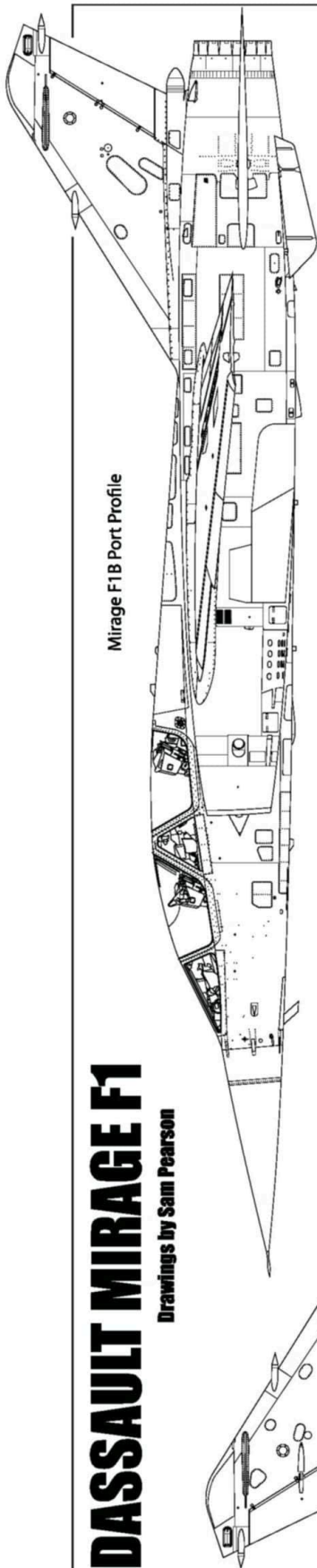
Mirage F1BJ, 2519, No. 25 Squadron, Royal Jordanian Air Force, Muwaffaq Salti Air Base, 1992.



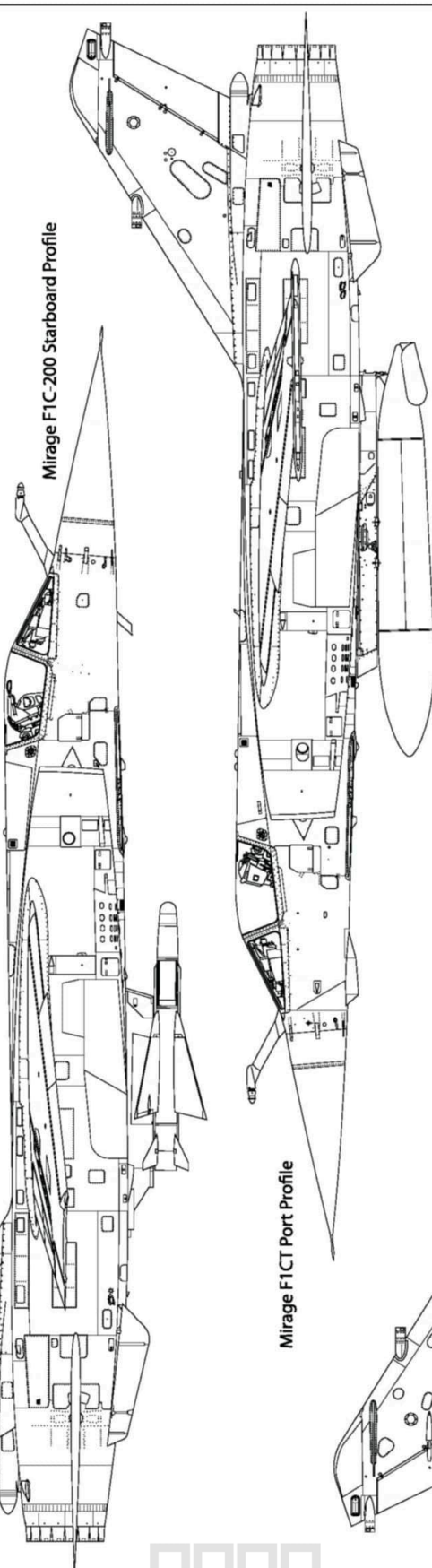
DASSAULT MIRAGE F1

Drawings by Sam Pearson

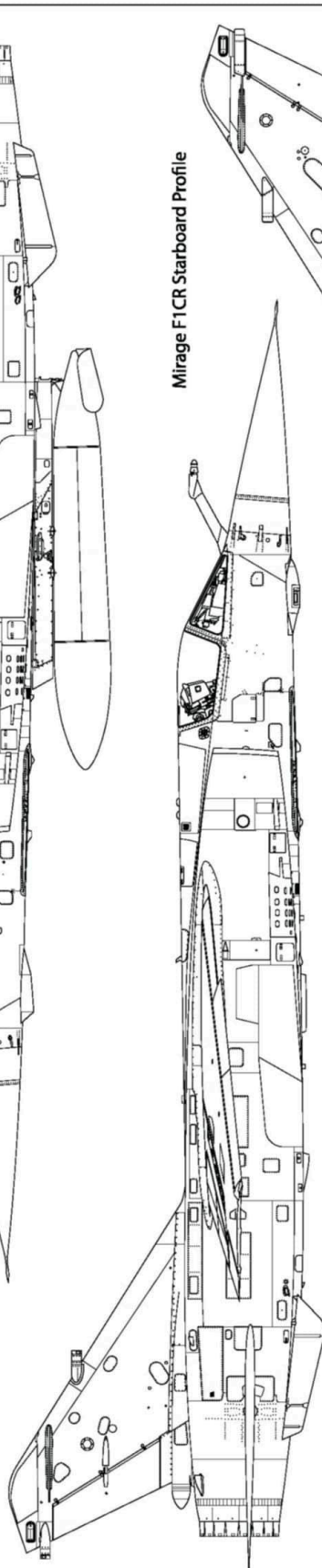
Mirage F1B Port Profile



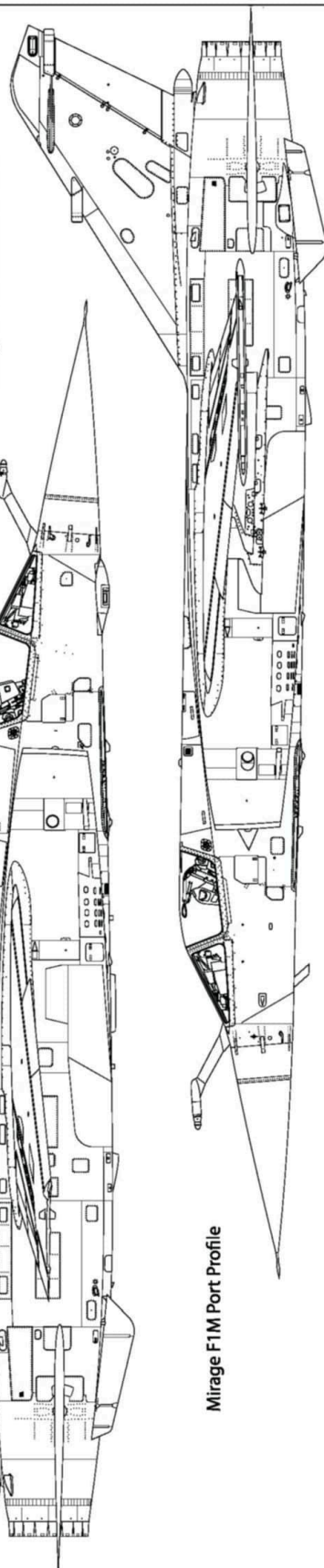
Mirage F1C-200 Starboard Profile



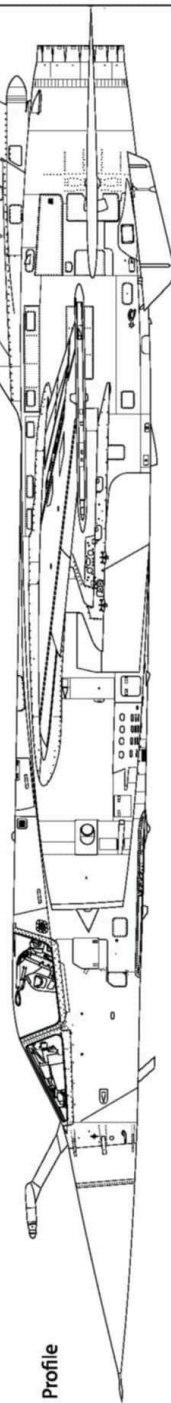
Mirage F1CT Port Profile

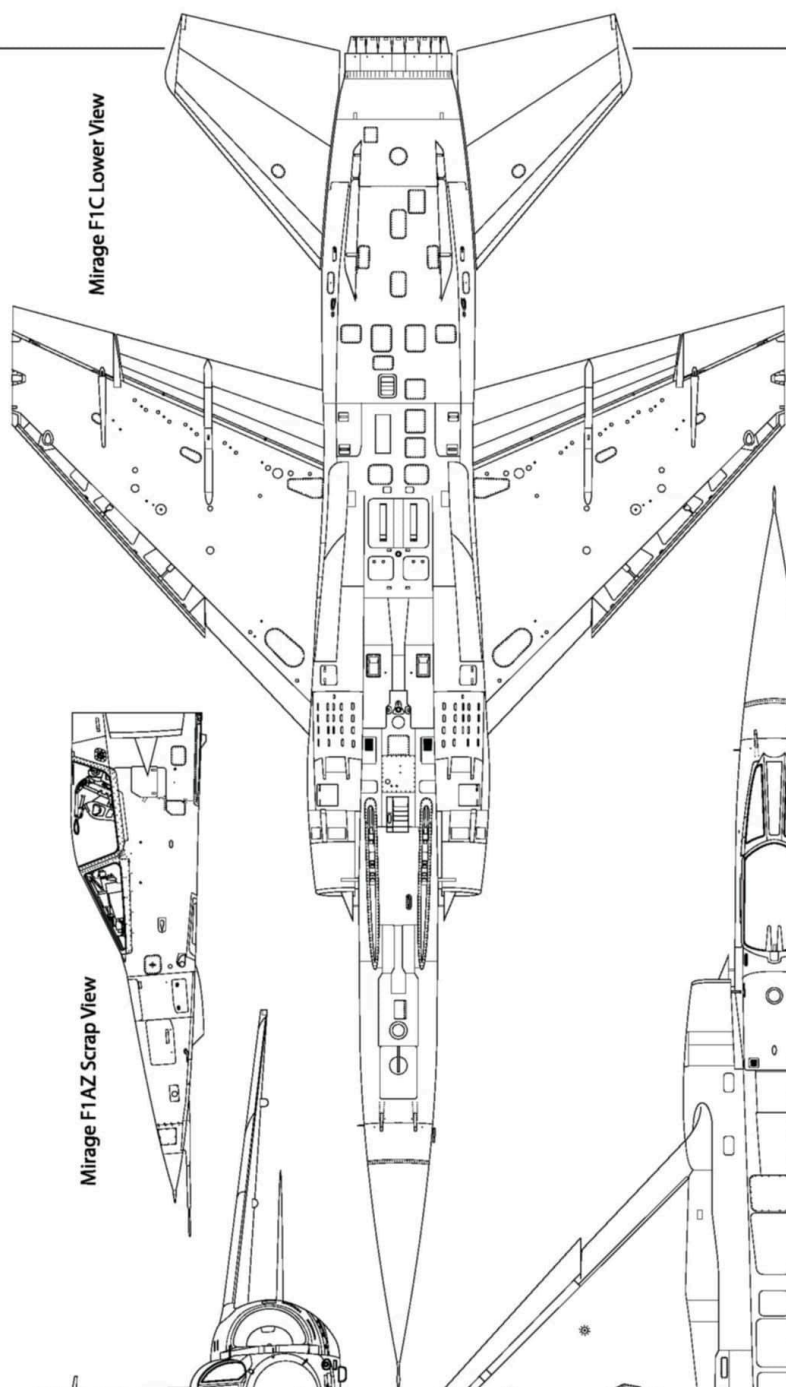


Mirage F1CR Starboard Profile

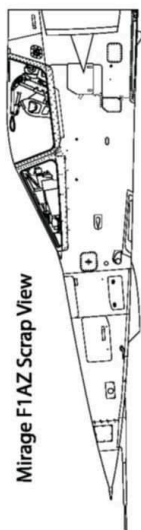


Mirage F1M Port Profile

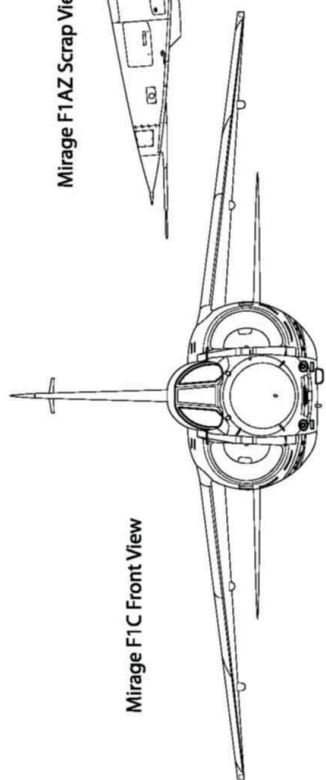




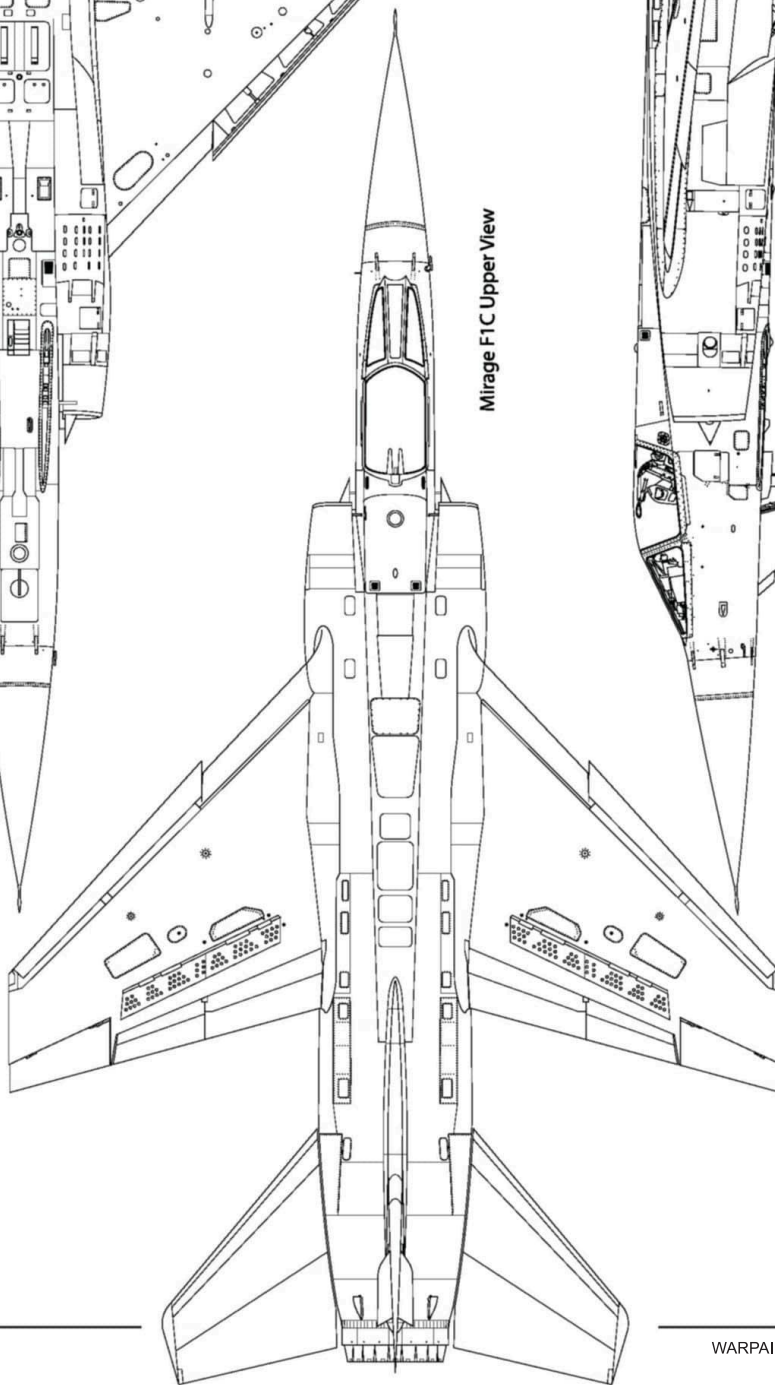
Mirage F1C Lower View



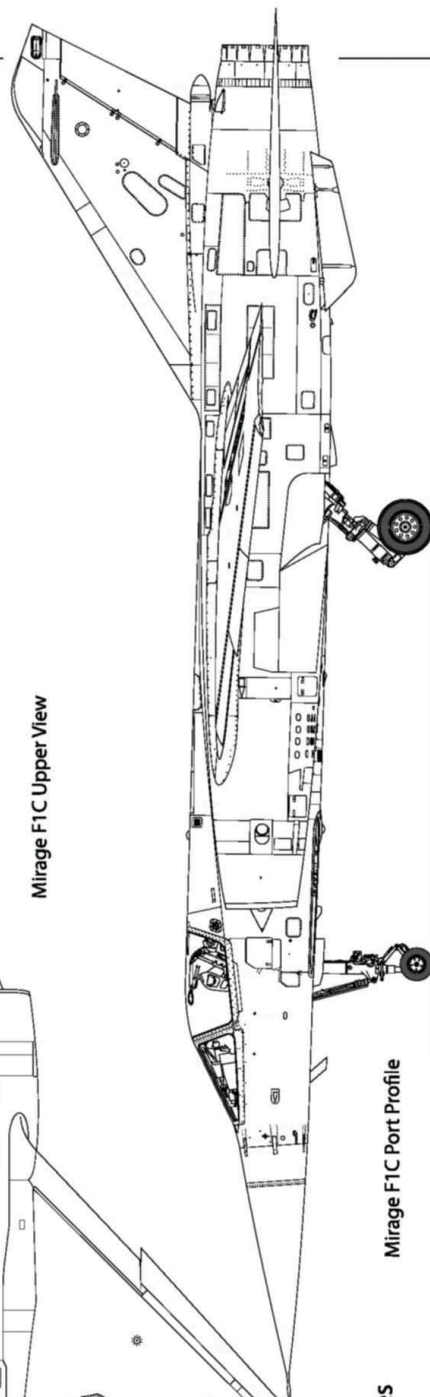
Mirage F1AZ Scrap View



Mirage F1C Front View



Mirage F1C Upper View

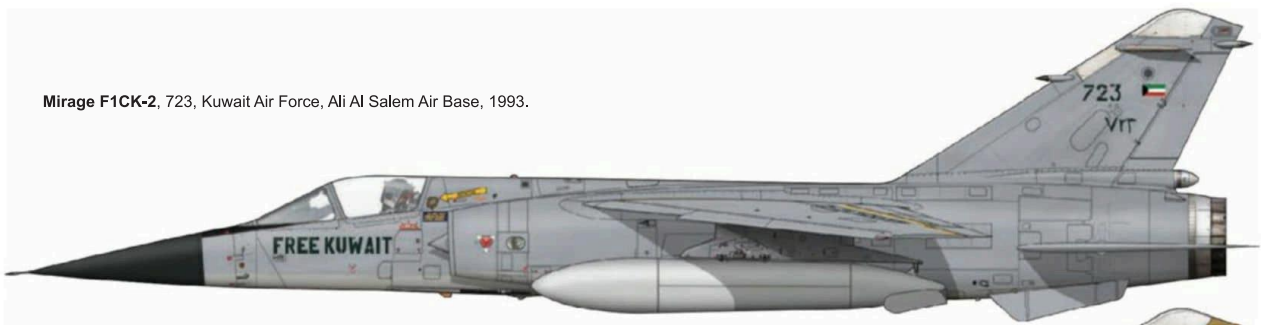


Mirage F1C Port Profile

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Mirage F1CK-2, 723, Kuwait Air Force, Ali Al Salem Air Base, 1993.



Mirage F1EDA, QA-76, No. 7 Air Superiority Squadron, Qatar Emiri Air Force, Doha, 1991.



Mirage F1ED, n°502, 1012 Squadron, Libyan Arab Air Force, as seen at Luqa, Malta after defecting from Libya, February 2011.



Mirage F1AD, n°402, Mirage F1 Squadron, Libyan Air Force, Al Watiya Air Base, 2021.



Mirage F1BQ, 4000, No. 89 Squadron, Iraqi Air Force, Saddam Airbase, early 1980s.



Mirage F1EQ-5, 4577, No. 81 Squadron, Iraqi Air Force, Saddam Airbase, 1985.





Mirage F1CZ, 201, No. 3 Squadron, SAAF, Waterkloof, February 1980.



Mirage F1CZ, 202, No. 3 Squadron, SAAF, Durban, 1986.



Mirage F1AZ, 230, No. 1 Squadron, SAAF, Hoedspruit, 1997.



Mirage F1AZ, 235, Avionics Demonstrator, SAAF, Swartkop, 2006.



Mirage F1EQ, 3-6202, 102 Tactical Fighter Squadron, Islamic Republic of Iran Air Force, 10th Tactical Air Base - Chahbahar, 2022.



Mirage F1JA, FAE 806, Escuadrón de Combate 2112, Ala de Combate n.o 21, Fuerza Aérea Ecuatoriana, Taura, 2009





Above: The F1BQ was a two-seat trainer delivered to Iraq, some of which were fitted with dummy flight refuelling probes. 18 were ordered with 15 delivered between 1980 and 1989. Iran seized twenty-four F1BQs and F1EQs flown over from Iraq, during the 1991 Gulf War. The aircraft pictured here is carrying Iranian markings over its former Iraqi Air Force camouflage. (Patrick Martin Collection)



Above: During 1975 an order for thirty Mirage F1CHs and twenty Mirage F1EHs was placed with Dassault by the Royal Moroccan Air Force, the first of which was to be delivered during 1978. The RMAF thus received 30 Mirage F1CHs, 14 Mirage F1EHs, and six F1EH-2000s.

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